US–Russia Data Exchange Documents, 1994 – 1999

Roy Jenne
Feb 25, 2003

This bundle of papers has US – Russia documents for the period 1994 – 1999.

1. Sep 1999 meeting report, held in Russia (20 p) ............................................. 1
2. Sep 1998, USA – agenda (3 p) ........................................................................ 21
4. Aug 1997, Russia (25 p) ................................................................................... 43
5. Aug 1996, USA – agenda (4 p) ........................................................................ 68
6. Aug 1996, USA, report (28 p) .......................................................................... 72
   • Atch 3 has history of data exchange (data lists) 1990 – 96
8. Nov 1996, Data Exchange Project of Working Group VIII (1 p) ............... 108
9. Apr 1996, Data to describe the Arctic Atmosphere (3 p) ............................ 109
   • For a meeting at US Embassy in Moscow
10. July 1995, Meeting in Russia (14 p) ............................................................... 112
11. Nov 1994, Meeting in USA (8 p) ................................................................ 126

NOTE: There are 133 pages in the main text and 4 pages in front.
US–Russia Data Exchange Documents, 1994 – 1999

1. Main data exchange documents given here:

<table>
<thead>
<tr>
<th>Date</th>
<th>Meeting Location</th>
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<td>Sep 1999</td>
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<td>Nov 1994</td>
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(Some related documents are included.)


Ray Jenne
NCAR, USA
Feb 21, 2003
Papers from the US – Russia Data Exchange

Roy Jenne
8 Aug 2000

Part A. Summary of the data exchange
This focus is on the datasets that have been exchanged, along with some information about the data. This is in a separate package.

Part B. Some miscellaneous papers
a. Data exchange project of WG-VIII (Nov 96, 4 p), a summary.
   Not here
b. Data exchanged during 1986 – 89
   Not here
c. Data to describe the Arctic atmosphere (18 Apr 1996, 3 p)
   Not here
d. Europe’s year of the avalanche (Mar 1999, 6 p)
   Not here
e. Agenda for Sep 1998 exchange meeting
   Not here
f. The US – Russia data exchange meeting, Aug 1996; a summary, 10 Sep 1996
   Not here
g. Agenda for Aug 1996 exchange meeting
   Not here
h. Agenda for Sep 1991 exchange meeting
   Not here
i. Text about monthly surface data for the world (US – USSR agreements), 28 Aug 1988
   Not here
j. US – USSR data exchange, 1 Sep 1988; a summary for the US WG-VIII office
   Not here

Part C. Reports from the annual data exchange meetings

Meet When | Where
---|---
Sep 1999 | Obninsk, Russia
Sep 1998 | Boulder, CO, USA
Aug 1997 | Obninsk, Russia
Aug 1996 | Boulder, CO, USA
Jul 1995 | Obninsk, Russia
Nov 1994 | Asheville, NC, USA
Plus | 2 pages
Aug 1993 | Obninsk, Russia (can't find text)
Summer 1992 | Cancelled (econ problems in Russia)
Sep 1991 | Boulder, CO, USA
Aug 1990 | Obninsk, Russia
Sep 1989 | Asheville, NC, USA (two versions)
Aug 1988 | Moscow, Russia (only 3 pages)
Sep 1987 | Boulder, CO, USA
Sep 1987 | Boulder, CO, USA (inputs for meeting)
C. Written agreements for the exchange.

The data coordinators for the US-Russia data exchange have been meeting almost every year since about 1979. Each year we prepare an agreement. The meetings and documents for recent years are listed below:

<table>
<thead>
<tr>
<th>Date</th>
<th>Meeting place</th>
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<td>September 1987</td>
<td>Boulder, CO</td>
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<td>August 1988</td>
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<td>Nov 2000</td>
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<td>Latest Sep, after 9/11 attacks</td>
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<td>Sep 2001</td>
<td>Obninsk and Moscow, Russia</td>
<td>Late Sep, after 9/11 attacks on USA</td>
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<tr>
<td>Nov 2002</td>
<td>At Asheville, US</td>
<td>Nov</td>
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</tbody>
</table>
Report of the
Data Exchange Coordinators Meeting
(Obninsk, Kaluga region, RIHMI-WDC, 12-18 September 1999)

This meeting was held under the bilateral program:
U.S. - Russia Agreement on Cooperation in the Field of Protection of the Environment and Natural Resources

Working Group VIII:
The Influence of Environmental Changes on Climate

PROJECT 02.08-14: Data Exchange Management

DATA EXCHANGE COORDINATORS MEETING
(Obninsk, Kaluga region, RIHMI-WDC, 12-18 September 1999)

IMPLEMENTATION REPORT AND PLANS FOR 2000

Participants in the Meeting:

a. US Side
   Roy Jenne, NCAR
   August Shumbera, Director WDCA for Meteorology

b. Russian Side
   Marsel Shaimardanov, Director RIHMI-WDCB
   Nikolai Kovalev, RIHMI-WDCB
   Alexander Sterin, RIHMI-WDCB
   Vyacheslav Razuvaev,
   Vitalii Pugolovkin
   Irina Gotovchenkova,
   Raphael Martuganov,
   Oleg Alduchov,
   Irina Chemikh,
   Sergei Somov,
   Svetlana Sornova,
   Vasili Sobolev,
   Elena Svishcheva,
   Tatyana Dagaeva,
   Mikhail Petrosyants (Moscow State University)
   George Gruza (IGCE)
   Nina Zaitseva (Central Aerological Observatory)
   Oleg Sirotenko (Russian Research Institute of Agricultural Meteorology)
   Nikolai Kazantsev (Institute of Geography RAS)
REPORT ON IMPLEMENTATION

EXCHANGE OF SCIENTISTS:


During 6-12 March, 1999, Drs. George Gruza, Vyacheslav Razuvaev and Alexander Sterin from Russia, visited NCDC, Asheville, to participate in meetings on the preparation materials for IPCC 2000.

During 12-18 September 1999, the US specialists Roy Jenne and August Shumbera visited RIHMI-WDCB Obninsk Russia, to discuss the results of bilateral Data Exchanges in 1998-99 and plans for future exchanges in 2000.

Other bilateral visits of specialists may occur at late 1999 if funding permits.

JOINT COLLABORATION:

1. Upper-Air Data Cooperation (CARDS Project)

In 1998-1999, the US and Russian Scientists continued to build the Comprehensive Aerological Reference Data Set (CARDS).

Russian side provided to US Side the Upper-Air Data for 1997-1998, to be appended to new version of CARDS Database, in early 1999. This CARDS Observational Database, for period 1991-1998, which was processed by CQC version 2 software, became available to Russian Side in September 1999.

The job for the goals of temperature correction model on determination of bases, tops and cloud amounts for low, medium, and high clouds from radiosonde soundings, is also performed in the framework of this activity.

The jobs on CARDS Database Analysis and preparing Upper-Air Informational Products, as well as jobs on CQC and cloud data adjustment, were continuing in late 1998-1999. In March 1999, the computer programs for calculation Monthly Station Statistics were implemented at NCDC. This enables to prepare Monthly Station Statistics more operationally. The Data Base of Monthly Station Statistics, which were based on CARDS Observational Database version 2, for the period 1991-1998, was forwarded to Russian Side in September 1999.

Publications were prepared jointly on comparison between CARDS and Reanalysis monthly Data of U/A temperature and humidity.

Both sides will consider the issue of joint CD-ROMs containing CARDS Upper-Air Derivatives, such as Monthly Station Statistics Data, and other.

Both sides continued their efforts to produce, check, correct and to update the combined Upper-Air Station History Database.

CARDS Data were used for climate change research, by both sides.

2. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Future exchange activities will include updating those data sets previously exchanged, with more current data. During 1998-99, several activities have taken place.
Russian Side prepared and forwarded to the U.S. Side in 1998-1999:

- The RHIHI provided to NOAA/NCDC the monthly CLIMAT Reports for 243 fUSSR stations for 1998
- The Daily Temperature (including MAX and MIN values) and Precipitation for 223 fUSSR stations for 1995-1998
- The first version (partly improved) of the Daily Precipitation Data Set for the fUSSR area for about 1570 stations, for the period 1884-1996, and the metadata files

U.S. side prepared and forwarded to Russia in 1998-1999:

- CD-ROM title "Global Daily Summary" containing temperature and precipitation data from global stations for the period 1977-1991
- CD-ROM title "Global Climate Normals: 1961-1990"

3. Marine Meteorological Data

COADS is a U.S. project involving a partnership of U.S. organizations working to update and improve the global surface marine database of ship and buoy observations, which then become available to the worldwide research community. International contributions are important for the project without which the database could not be updated to such a global extent. Over the years RHIHI working through Working Group VIII has provided extensive input records to the COADS database and in return the COADS data have been provided back to Russia.

The COADS archive was updated and extended for the 1980-1997 time period. This work was completed in June 1999. The project goals are now to upgrade the 1830-1949 period. This effort includes, changing the base format (from CMR to LMRF), recovering data fields not previously available, and adding additional data sources. MORMET is one of the new data sources for period. After this work is finished MORMET will be fully incorporated into COADS. A few other significant additions are the UK Marine Data Bank, the World Ocean Data Base 1998 by NODC, the recently digitized Japanese data from the Kobe Observatory, and numerous data from U.S. digitization projects.

During 1998 and 1999 RHIHI and NCAR (Shaimardanov and Worley) have written a proposal that seeks funding from CLIVAR (NSF) to digitize surface meteorological and radiation measurements from Russian research vessels. These approximately six million observations from 1936-1996 would be an important contribution to the global ocean archives. The proposal is expected to begin being funded within year 2000.

Because of project priorities and personnel changes at RHIHI no new marine surface data were exchanged during 1998. Experiments were successfully run using CD-ROMS as a data exchange media. The full MORMET archive, which was first delivered to NCAR beginning in 1988, was copied to CD-ROM and returned to RHIHI. In return RHIHI provided PC software to read the versatile (variable length binary records) LMR COADS format.

4. River Flow Data

In 1998-99, Russian side continued to work with the data set of mean monthly and mean annual river flow data from the US side – USGS, that were prepared through 1995-96 and exchanged to Russian side in August 1996, and had got certain experience in working with these data.

Both sides exchanged opinions on the QC methods for river data, and underlined the need to activate the cooperation on these issues.

5. Snow Data

The bilateral cooperation on improving of the exchanged in 1996-97 data sets and analyses of snow cover conditions continued in 1998-99, between WDC-A for Glaciology (Snow and Ice), from the
U.S. side, and Institute of Geography and RIHMI, from Russian side. Snow cover data sets were prepared in both countries.

6. Mountain Snow Data

Both sides continued to study the methods they use for mountain snow data collection and archiving. The U.S. side informed about their experience in this issue.

The US has manual snow course data for about 1000 places. These are visited periodically during the winter season to measure the depth of snow and the amount of water in the snow. The snow survey has plans (in Aug 1998) to place all of these data for the period of record onto a CD-ROM by Dec 1999.

In addition, there are daily data from about 650 Snotel sites in the western US. These stations give measurements of the weight of snow on top of a large snow pillow. They also measure daily precipitation (frozen or water) and temperature. There are also plans to put these data onto a CD-ROM, but people want to work on some data quality issues before that is done.

The Russian side has discussed the possible preparation of the Russian data set for the mountain snow. Both sides believe that more activity on this issue is desired.

7. Preparation of Bias-Free Data Sets

During 1998-1999, the work on developing bias-free data sets continued at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention is given to improving daily minimum, maximum, and mean temperature and pressure and daily precipitation data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades. Both NOAA/NCDC and RIHMI scientists will continue their work on the basis of these data. Investigation of the changes in extreme climatic events is considered as a main goal of this work in the nearest one-two years.

8. Global Water Cycle

A more detailed version of this part program (the publications, the plans) is in Attachment 1

9. Soil Temperature Data Project

Both sides expressed interest in the exchange of these data, and in research involving the soil temperature data. The main goal of this project is to organize soil temperature data sets for Russia and North America, to exchange the data for intercomparison and to undertake a joint assessment of soil temperature variations for the 2 countries. Such time series will provide a baseline for global change studies.

Digitization of 120 station records from Russia has been completed at the Soil Institute, RAS, in Pushchino. Preliminary assessment of data quality and completeness of data set is made. Accompanied documentation (description of the data set format, record structure and other) has been prepared. This data set and analogous data set for the US are ready for joint work by Russian and the US researchers for comparison and checking procedures.

10. Translated Abstracts of Russian-Language Climate Change Publications

The Carbon Dioxide Information Analysis Center (CDIAC) at the U.S. Department of Energy's Oak Ridge National Laboratory, in collaboration with the All-Russian Research Institute for Hydrometeorological Information-World Data Center (RIHMI-WDC) completed the fourth volume of the translation series of Russian-language climate-change literature. This volume, "Selected Translated Abstracts of Russian-Language Climate-Change Publications: IV. General Circulation Models (ORNL/CDIAC-94; Proceedings of RIHMI-WDC, Issue 165)" completes the series. The entire series is now available both in print and
online (http://cdiac.esd.ornl.gov/epubs/cdias/russengl.html). No certain activity within the reported period took place.

11. Numeric Data Packages (NDPs)

CDIAC, in cooperation with the National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) - World Data Center, Obninsk, updated "Six- and Three-hourly Meteorological Observations from 223 U.S.S.R. Stations" (ORNL/CDIAC-108, NDP-048). This database contains 6-and 3-hourly meteorological observations from a 223-station network of the former Soviet Union. The first version of this database extended through the mid-1980s (ending year depended upon station) and was made available in 1995 by CDIAC as NDP-048. The update of the database includes data through 1990. Station records consist of 6-and 3-hourly observations of some 24 meteorological variables including temperature, past and present weather type, precipitation amount, cloud amount and type, sea level pressure, relative humidity, and wind direction and speed. The 6-hourly observations extend from 1936 through 1965; the 3-hourly observations extend from 1966 through 1990. These data have undergone extensive quality assurance checks by RIHMI-WDC, NCDC, and CDIAC. No certain activity within the reported period took place.

12. Satellite Data Management

In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) have started to be received and registered at points of Yakutsk and Khabarovsk. The US provided on-land facilities for these goals.

Both sides arranged, in parallel, Databases of the HRPT Data registered in Yakutsk. By August 1997, 103 DAT tapes with HRPT data from Yakutsk, were transferred to the US side (for EROS Data Center in South Dakota).

The US Side provided DAT tape drive and, partly, DAT tapes for these data exchanges.

The exchanges continued at late 1997 and early 1998. Problems of tape compatibility arose in early 1998. In early 1999 the U.S. Side (NASA) and Russian side (ROSHYDROMET) announced the intention to extend the agreement to future and to provide updating the equipment at Yakutsk station by the U.S. Side. This is expected to renew the data archiving and exchanges. Both sides will do their best to resolve the existing problems.

The additional activity out of the planned bilateral data exchanges took place. The RIHMI-WDCB (Obninsk) received from NSIDC - University of Colorado at Boulder (WDC-A for Glaciology) 46 CD ROMs containing the DMSP SSM/I Data Products.

13. Development of Telecommunications

Both sides agree that telecommunications become more and more powerful tool for climate data and information exchanges.

Both sides believe that access of RIHMI-WDC to INTERNET facilities, which was provided in the middle of 1997, is extremely useful for bilateral cooperation and for advanced Data exchange activity. RIHMI-WDC has got certain opportunities to obtain climate data via FTP and WWW. However, considering the role of RIHMI as of World Data Center, the current capacity of these facilities is not sufficient and should be considered as the beginning one. By the middle of 1999, the peak speed of access via FTP at RIHMI-WDC, for an end-user, does not exceed 200 kbytes per second. In fact, the real speed of access is lower, so the further development of these opportunities for RIHMI-WDC as that for the World Data Center, that could increase the FTP access speed and to increase the volumes of data available for bilateral exchanges via telecommunications, is highly significant for both sides.

14. Precipitation Data Rescue Project

A project to rescue precipitation data at RIHMI has been initiated in 1998 and to be continued during 1999-2000. The project activities in the period of consideration included:
(1) The rescue of data on about 10,000 aging 9-track magnetic tapes to newer media was made,
(2) Some problems were encountered where some records on the old tapes could not be read. Additional efforts will be made to re-read these tapes by adjusting tape drives. Data not recorded from the tapes will be keyed.
(3) The digitization of precipitation data stored on manuscripts, and
(4) The exchange of these data between Russia and the USA.
The first version of the daily precipitation data set (raw data) is prepared and sent to the US in September 1998. It will be checked and examined by both NCDC and RIHMI specialists. Partly improved versions were prepared and sent to the US in March and in September 1999.

15. Preparation of North Pole Rawinsonde Station Data

The Russian side took surface and upper air observations from a series of ice island stations for about 1954-1990. It was a great achievement by the observers to gather these important observations. Much of the surface data has already been prepared on a CD-ROM. The upper air (U/A) data is also very important for use in research.

About 1990, a dataset of only the lower levels of rawinsondes, and only one time per day (00 GMT) became available. Additional data, but not all, were added to the data set and an interim dataset was prepared about March 1997. The data still had some serious problems with the date/time of soundings and in the merging of the upper and lower parts of rawinsonde soundings.

A more complete dataset of North Pole raobs were prepared by Russian colleagues. To resolve the merging and the date/time problems, the entire radiosonde observations were re-keyed beginning with the surface. These observations were checked for quality and for date/time correctness.

16. Fresh Water Ice Data

Under the collaborative work between GGI, St. Petersburg and WDC-A for Glaciology, data on freeze-up/break-up for 48 Russian Arctic draining rivers were digitized and transferred to WDC-A. Most records are for 1988-94 but for 7 stations they are longer, in some cases to the 1930s.

17. DATA EXCHANGES in 1998-1999

Forwarded to the U.S. :

- The RIHMI provided their Upper-Air regional and GTS Databases (Data for 1997-98), to be appended to CARDS Data Base Version 2, during 1999.
- The RIHMI provided derived from CARDS observational Data Base, - Monthly Aerological Data Set, with extended non-missing humidity parameters, for the period 1948-1990, to NCDC/NOAA.
- The Data set on monthly mean river flow and daily river flow for separate stations of Russia (22 stations), were provided in September 1998
- The monthly mean pressure, humidity and sunshine time series for 1891 to 1995 for 243 fUSSR stations
- The RIHMI provided to NOAA/NCDC the monthly CLIMAT Reports for 243 fUSSR stations for 1998
- The Daily Temperature (including MAX and MIN values) and Precipitation for 223 fUSSR stations for 1995-1998
- The first version (partly improved) of the Daily Precipitation Data Set for the fUSSR area for about 1570 stations, for the period 1884-1996, and the metadata files

Forwarded to Russia:

- The RIHMI-WDCB (Obninsk) received from NSIDC - University of Colorado at Boulder (WDC-A for Glaciology) 46 CD ROMs containing various DMSP SSM/I Data Information Products
- The U.S. Side provided CARDS-based monthly station statistics data (MONADS), for the period 1991-98, to RIHMI-WDCB in September 1999.
• The U.S. side provided in September 1999 13 CD-ROMs of reanalysis data for 1961-1972 and for 1998, so that now RIHMI-WDCB has all CD ROMs for 1961-1998 (38 CD ROMs)
• One reanalysis CD ROM with monthly analyses for 1948-1998 was provided in September 1999
• 3-hour world NCEP surface synop data for 1991-97 were provided on the seven Exabyte tapes in September 1999
• CD-ROM title "Global Daily Summary" containing temperature and precipitation data from global stations for the period 1977-1991
• CD-ROM title "International Surface Weather Observations" data for the period 1982-1997
• CD-ROM title "Global Climate Normals: 1961-1990"

JOINT PUBLICATIONS:


The other publications are listed in Attachment 1.
PLANS FOR 2000

PROJECT 02.08-14: DATA EXCHANGE MANAGEMENT

U.S. Project Leader: Roy Jenne (NCAR)
Russian Project Leader: Marsel Shaimardanov (RIHMI-WDCB)

1. Upper-Air Data Development

1.1 Comprehensive Aerological Reference Data Set (CARDS)

In 1999-2000, U.S. and Russian scientists will continue to build the Comprehensive Aerological Reference Data Set (CARDS). The new version of CQC was implemented at NCDC in 1998 and will produce new versions of CARDS Database Version 3, which will become available to both sides.

Work will also continue to develop cloud models for the goals of cloud data control and cloud parameters reconstruction from CARDS Data. NCDC and RIHMI-WDCB will consider the issue of CD-ROMs with CARDS-based Data and Information as a significant result of this Joint Activity.

Selected temperature change climatological analysis based on CARDS Data in comparisons with data on temperature from other sources, will be also continued in 1999-2000.

Up to two RIHMI specialists may be invited to NCDC in late 1999-2000, if funding permits, for continuing and review of collaborative work on CARDS, and for outlines of future U/A Data and Climate Joint Activity.

Both sides will strive to prepare jointly a paper that will document the achievements of the CARDS Project, and to make this information available for publication in national/international journals, WMO Issues, and on the World Data Centers' Web pages.

In 1999-2000, the Russian side will forward to the U.S.:
(1) The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.
(2) Observational upper-air Data for 1999 to be included into CARDS Database
(3) Information on Station Histories to be included into new versions of Joint Station History Database, if changes will occur.

In 1999-2000, the U.S. side will forward to Russia:
(1) The CARDS database version 2 through 1999 processed by the Version 2 of CQC software.
(2) The CARDS Database output from CQC Version 3, for all the period through 1999
(3) The CARDS Station History Database versions as new versions will be produced.
(4) Monthly station (Monthly Aerological Data Set) and gridded climatology products through 1999.

1.2. U/A Climate Time Series Comparisons and Analyses

Both sides have begun their efforts on comparisons of U/A Climate parameters which are obtained from various sources (CARDS data of various spatial and temporal resolution, Satellite Data, Reanalysis Data, etc.). Such comparisons are of interest for improvement of climatic data.

Both sides believe that continued comparisons and joint analysis of climatic time series obtained for the atmosphere from various data types and by various authors, will become a reasonable continuation of joint activity on U/A data. Publications in the Russian scientific magazines, that will reflect the basic information on reanalysis projects, are highly desirable.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Alexander Sterin [RIHMI-WDCB])
2. Ship Data (COADS)

During the coming year the COADS project will complete the work on the 1830-1949 period. At this time we propose that a new copy of COADS 1830-1997 be provided to RHI MI. This would include all the LMRF formatted observations and 2x2 monthly summary statistics. All totaled this will be approximately 8-10 GBytes of data.

The NCAR and RHI MI-WDCB plan to work jointly over the Proposal on "Digitization of Historical Marine Meteorological and Radiation Observations from Russian Research Vessels". The corresponding Proposal is forwarded to CLIVAR Office and to Roshydromet. The benefits from the Project, if accepted, are outlined below.

COADS is recognized worldwide as the most extensive set of surface marine data. It is a result of cooperative efforts at the NOAA National Climatic Data Center (Asheville, North Carolina) and Climate Diagnostics Center (Boulder, Colorado), and Data Support Section of the Scientific Computing Division at NCAR. Briefly, COADS is a large (over 110 million records) and complex (over 50 different data sources) marine surface data archive. Archive upgrades are prioritized according to scientific research needs, e.g. in the past year the 1946-1997 period has been updated to support global atmospheric reanalysis projects as well as long term climate assessment studies. Following are a few noteworthy accomplishments in the recent 1980-1997 update. The merger of the UK Marine Data Bank with COADS, inclusion of surface observations from the World Ocean Database 1998, and a full upgrade of the TOGA/TAO buoy data by using the post deployment recovered standard archive as a replacement for the inferior real time GTS received buoy data.

Two important marine observation collections are available at RHI MI. The first is likely to be one of the largest non-digitized marine surface data sets in the world. It has an estimated 5 million observations from Russian R/Vs contained in over 10000 reports, logbooks, books, collections, marine annuals and other materials. Unfortunately, only 5% of these observations are suitable for scanning with automatic character recognition. This is typical for historical marine surface observations. Thus, manual digitization is required for most of these historical data. The second collection contains standard marine surface observations like the first, but is augmented with a unique set of surface radiation measurements. These 600 thousand observations are from the worlds and include all the parameters necessary to estimate the general radiation budget at the ocean surface, e.g. sun altitude, long-wave radiation, short-wave radiation, albedo, and net radiation. This collection is 10% digital at this time with remaining observations are in over 700 research reports. The especial value of these data joined with the meteorological parameters is the ability to process synchronous observations of solar radiation and meteorological observations, including several types of cloud observations.

These data are high quality and unique, because the observations were made by skilled scientists during oceanographic experiments and expeditions from 1936 to 1996. Preliminary assessments have been made in terms of numbers of R/V cruises and observations for the largest set of observations, we expect the radiation measurements to show similar patterns.

The frequency of observation during the cruises was typically once every three hours. During experiments that required more detailed information the observations were often made each hour. These data are unique to the extant digital archives because they were not transmitted electronically on telecommunication systems and therefore have not been captured and included in other data sets that may already be part of large data archives.

(U.S. PI: Steven Worley [NCAR], Joe Elms [NCDC], and Scott Woodruff [NOAA/OAR]; and Russian PI: Marsel Shaimardanov [RHI MI-WDCB])

3. River Data

Both sides believe that river flow data exchanges and activity are of high significance for climate processes studies. Such activity needs to be speed up by both sides. Both sides believe that future efforts on river flow data exchanges, creation of joint datasets and on joint studies of river flow processes, are highly desired. Sharing the expertise in quality control of river flow data by both sides is one of directions in these efforts.
Both sides agree that a meeting between specialists of both countries to discuss snowpack measurement procedures, as well as streamflow measurements, archiving and forecasting procedures, could be arranged. The period after 2000 could be considered for this meeting. Specialists from various agencies involved in these problems, could be participating this meeting. The possibilities on arrangement this meeting will be considered by both sides.

(U.S. PI: Roy Jenne [UCAR], Jim Slack [USGS] and Russian PI: Marsel Shaimardanov [RIHMI-WDCB])

4. Snow Data

The possibility of updating the Russian 10-day snow transect data into the 1990s and filling in some of the gaps in coverage in northeastern Siberia is under discussion between R.G. Barry and A.N. Krenke. Contingent on funding, it is proposed that this activity be continued at a modest level during 2000.

It is also agreed that development of this database back to at least 1950 would provide a valuable validation data set for the various reanalysis projects. It would be desirable to use the existing record for approximately 1345 stations for 1966-1990 in order to establish the station coverage that is necessary to capture the main spatial patterns for this historical record. Funds for such an activity need to be identified.

US PI: Roger Barry (CIRES/WDC-A for Ice and Snow) and Russian PI: Vyacheslav Razuvayev (RIHMI-WDCB) and Alexander Krenke (Institute of Geography of Russian Academy of Science).

5. Soil Temperature Data Project

Soil temperature data, in regions with permanently or seasonally-frozen ground, are a significant indicator of changes in surface boundary condition. They are also important for the validation of climate models and in the parameterization of land surface modules in GCMs. It is essential, therefore, to organize data sets of soil temperature measurements.

The two sides have exchanged sample data sets and selected data have been issued on the CAPS CD-ROM (NSIDC, 1995). For 2000 it is planned to make joint analysis and QC for records from about 140 Russian stations for which digitization has been completed in 1999. A further ca. 100 stations are being digitized. NSIDC, in conjunction with the International Permafrost Association and WCRP-GCOS Terrestrial Observations Panel, is developing plans for a Global Terrestrial Network for Permafrost (GTNP) to include the Circumpolar Active Layer Monitoring (CALM) network on maximum summer thaw depths and the permafrost thermal state from selected borehole data. These data will be accessible via the CALM Web: http://www.geography.uc.edu/CALM and the Borehole Web:http://sts.gsc.nrcan.gc.ca/permafrost.

The U.S. side will also continue to assemble comparable soil temperature data from North American sources as funds permit.

The soil temperature data will be used in GCM simulations for climate change scenarios by collaborators F. Nelson and O. Anisimov. It is proposed that the 140 Russian station archive be made available (CD and/or ftp) for release in 2000. It is possible that a CAPS version -2 CD-ROM containing these and other new data sets could be issued.


6. Fresh Water Ice Data

The main goal of this activity is to exchange information on ice conditions on freshwater bodies. Such records have been shown to be a valuable indicator of changes in transition season temperature and are of intrinsic interest in relation to river flow in northern rivers, conditions for freshwater biota and so on. The total data volume is small but the information is currently not readily accessible. During 1999, the US side (through NSIDC) expects to acquire an important database of freeze-up/break-up dates on lakes throughout North America and Scandinavia, especially. The records were assembled by an ad-hoc Lake
Ice Analysis Group sponsored by the Limnology Center, University of Wisconsin under NSF support to Dr. J. Magnusson. The details of this database will be provided as they become available. In addition, an 80-year record of ice break up dates on the Nenana River, Fairbanks, Alaska, available at NSIDC, will be added. The data will be documented, formatted and QC'd and then made available for release.

Discussions between NSIDC and GGI, St. Petersburg will be continued in relation both to northern river ice records and any comparable lake ice data records. To date, NSIDC has received river ice thickness and duration data for 49 stations, 9 of which have records exceeding 50 years. The documentation to accompany their release via ftp is in preparation. Funds need to be identified to maintain this activity.

(PI from Russian Side: Dr. V. Vuglinsky, GGI, St. Petersburg, PIs from U.S. Side: R. G. Barry, WDC-A for Glaciology, J. Magnusson - Center for Limnology, Univ. of Wisconsin)

7. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NCDC and RIHMI. Future exchange activities will include updating those data sets previously exchanged, with more current data. During 1999-2000, several activities will take place.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

8. Preparation of Bias-Free Data Sets

During 1999-2000, the work on developing bias-free data sets will continue at NOAA’s National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention will be given to improving daily minimum, maximum, mean temperature and daily precipitation data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades and for the investigation of the changes in climatic extreme events. Both NOAA/NCDC and RIHMI scientists will continue work on the basis of these data sets.

(U.S. PI: Thomas Karl [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

9. Global Water Cycle

Please see Attachment 1 for information about the plans for this project.

10. Translated Abstracts of Russian-Language Climate-Change Publications

Both sides will consider the possible ways to continue activity on translated abstracts and its possible outputs. The continued cooperation between both sides with active participation of ORNL/CDIAC is highly desirable, with a focus on updating the 4-volume translated abstract series with more recent literature.

(U.S. PI: Robert Cushman [ORNL/CDIAC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

11. Numeric Data Packages (NDPs) and Data Publication

In cooperation with the Russian Research Institute of Hydrometeorological Information (RIHMI) – World Data Center, Obninsk, and NOAA’s National Climatic Data Center (NCDC), the Carbon Dioxide Informational Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) produced additional numeric data packages (NDPs) based on expanded versions of the 223-station Russian climate data sets.

The CDIAC numeric data packages NDP-048 (6- and 3-hourly meteorological observations) and NDP-040 (daily temperature and precipitation) for 223 Russian stations will be updated with newly available data.
Both sides believe that the Trends series (Trends ’90, Trends ‘91, Trends ‘93 and Trends Online) is a good way to provide global change data and information to the research community and other users, and future continuation of this activity with participation of Russian specialists is reasonable. The continued cooperation between both sides, with active participation of ORNL/CDIAC, is highly desirable. Both sides have an interest in the inclusion of additional Russian climate data in Trends Online.

The development of telecommunications (see item 14) is highly desired as a good way to enhance Trends Online issues. Possible creation of distributed climate information data bases will be considered.

(U.S. P.I.: Robert Cushman, Dale Kaiser [ORNL], August Shumbera [NOAA/NCDC] and Russia P.I.: Marsel Shaimardanov, Vyacheslav Razuvaev, Alexander Sterin [RIHMI-WDCB])

12. Satellite Data Management

Both sides consider the need to continue on satellite data exchange. In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) received and registered at point of Yakutsk (Russia).

The streamflow of HRPT data from Yakutsk station has been interrupted now due to the equipment problems. The planned update of Yakutsk station equipment will enable to resolve the existing problems of data archiving and exchange.

(U.S. PI: Roy Jenne (NCAR), and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

13. Precipitation Data Rescue

The work for creation of the baseline precipitation data set will be continued in 2000. The complete assembly of daily precipitation (final version) will be prepared in 1999-2000 on the basis of rewrited on newer media meteorological data files, and metadata will be gathered and presented as well as data files

(PI from U.S.: August Shumbera (NCDC/NOAA) and PI from Russia: Marsel Shaimardanov (RIHMI-WDCB)).

14. Development of Telecommunications

Both sides believe that access of RIHMI-WDC to INTERNET facilities, which was provided in the middle of 1997, is extremely useful for bilateral cooperation and for advanced Data exchange activity. RIHMI-WDC has got certain opportunities to obtain climate data via FTP and WWW. However, considering the role of RIHMI as of World Data Center, the current capacity of these facilities is not sufficient and should be considered as the beginning one. The further development of these opportunities for RIHMI-WDC as that for the World Data Center, that could increase the FTP access speed and to increase the volumes of data available for bilateral exchanges via telecommunications. It is highly significant for both sides.

Both sides will consider possible increase of telecommunications capacities of RIHMI-WDC as of World Data Center. To provide wider access to existing INTERNET resources in Global Changes, Global Changes Data, to Climate Data, Information and Climate Products, both sides plan to exchange their lists of known, non-depending on country, Web Sites, which contain such information. Further actions on this will be considered after this first step in sharing the experience in telecommunications.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

15. Mountain Snow and Ice Activity.

Both sides reviewed existing data sets on mountain snow and ice. The methods of mountain snow and ice measurements, used by each of sides, were also reviewed and discussed.

The US Data set is currently in digital format, while the Russian data set has not yet been digitized. The US Side agrees that monthly snow course data will be published on CD-ROM by about December 1998.
This CD-ROM will be provided to the Russian side. Daily snow data, collected through the SNOTEL network, will be made available to the Russian side on the CD-ROM after approximately 2 years.

Both sides agree to consider the possible ways to provide the digitizing of the data of Russian side on snow and ice in mountains.

RIHMI is currently in the process of collecting the hardcopy data on mountain snow. These data are reflecting the mountain territories of Russia.

Both sides agree that a meeting between specialists of both countries to discuss snowpack measurement procedures, as well as streamflow forecasting procedures, could be arranged. Specialists from various agencies involved in these problems, could be participating this meeting.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDC))

16. Extreme Climatic Events

The joint work for the study of the changes of extreme climatic events will be continued in 2000. The special attention will be paid for the investigation of the changes in precipitation regime and heavy rainfall occurrence. It is proposed to use the new baseline daily precipitation data set for the Russian and the U.S. area for this purpose. The possibility of the preparation of the special pluviograph data set for the study of the changes in heavy rain fall occurrence is considered now in RIHMI.

(U.S. PI: Tom Karl, Pavel Groisman [NCDC] and Russian P.I.: Marsel Shaimardanov, Vyacheslav Razuvaev [RIHMI])

17. Preparation of North Pole Station Data

The preparation of North Pole Station dataset is completed now. The U.S. side will invite two Russian specialists in November 1999 to discuss the dataset. The dataset would be reviewed for remaining date/time control problems and if any problems are detected, the Russian colleagues would correct these. A final version would be made available to both sides.

(PIs US: August L. Shumbera, Jr. [NCDC], Roy Jenne [NCAR]; Russia: Dr. Nina Zaitseva [CAO], Dr. Andrey Nagurny [AARI]).

18. High-resolution baseline long-term data set of in-situ meteorological observations

Among the questions raised about the specifics of contemporary climatic change are those that could not be answered using existing global meteorological data sets, such as GHCN. Among these questions are:

- Changes in the structure of the diurnal cycle of surface air temperature, humidity, cloudiness, and precipitation; changes in convection processes over the land
- Changes in extreme and/or unusual events

The answers to the first group of questions require access to hourly/3-hourly meteorological data and a careful pre-processing of these data in order to retrieve reliable information about the changes in the diurnal cycle. A proper assessment of changes in land use around the stations, observational practice, and instrumentation used, as well as a sufficient level of the initial quality control provided by the national meteorological services are essential too.

The answers to the second group of questions require a high spatial resolution of the original station network used in the analysis due to small radii of correlation of the processes involved.

The above justifies the one-year pilot study for the needs of climate change assessments, with the following objectives:

- To evaluate the feasibility of current GTS Streams of synoptic information to provide the scientific quality time series of hourly/daily meteorological information.
- Prepare recommendations for an international scientific-quality archive of high temporal (with diurnal cycle resolution) and spatial (as dense as possible) homogeneous time series of major meteorological fields for North America and Northern Eurasia for the post-WWII period, based on national meteorological services sources.
• Prepare a prototype of such archive using the data from Russian and U.S. national archives. Up to two Russian scientists will visit NCDC during the next year for a total of up to six months for joint work with Drs. Peterson and Groisman, provided funds become available. Their work will be carried in support and in the framework of the proposed project and the NOAA/NASA funded project "Multinational baseline daily temperature and precipitation data set for global change assessments".

(Participant Institutions/Investigators: U.S.: NCDC, Drs. Thomas Peterson (NCDC) and P. Ya. Groisman, UCAR, and Russia: RIHMI-WDC, Dr. Vyacheslav Razuvaev)

19. Data Coordinator's Meeting

The next meeting of the data coordinators will be held at U.S on July-October 2000. Up to three (3) specialists from Russia will be invited for up to seven (7) days.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])

20. Additional Exchange of Scientists

Specialists from Russia have presented papers to 24 Annual Climate Diagnostics and Prediction Workshop in Arizona, USA, in October 1999. The papers are accepted by Workshop Committee and are included in Oral and Poster Sessions. Search of any available possibilities in participating such Meetings is recommended, as they are very significant for specialists from both sides.

Up to three specialists from Russia could participate the 25 Annual Climate Diagnostics and Prediction Workshop in U.S. in late 2000.

Up to two RIHMI specialists may be invited to NCDC in late 1999-2000, for continuing and review of collaborative work on CARDS.

Pending the availability of funds, additional reciprocal visits of Russian and U.S. specialists will be considered for participation in international and bilateral meetings. This will support the activities conducted within the framework of Project 14.

(U.S. PI: Roy Jenne [NCAR] and Russian PI: Marsel Shaimardanov [All-Russian RIHMI])


Both sides believe that Climatic Data Exchange Management upon the Project 14 of Working Group 8 is developing sustainably and is a good sample of mutually effective joint cooperation between both countries. Both sides believe that there existed a strong need to continue bilateral activity on Climatic Data Exchange Management. The data that have been made available under this cooperation, have been used for both Russian and U.S. research activities, and they have also been used by scientists in other countries.

Both sides believe it necessary to continue and strengthen the activities of Working Group VIII: The Influence of Environmental Changes on Climate, under U.S.-Russia Agreement on Cooperation in the Field of Protection of the Environment and Natural Resources.
SUMMARY OF PLANNED 1999-2000 DATA EXCHANGES

From the U.S. to Russia:

- The CARDS database Version 2 Data for period through 1999, as data from additional sources are appended and processed jointly with existing data by the Version 2 CQC Software, will be forwarded to RIHMI.

- The later version of CARDS Database Data (CQC Version 3 Outputs 1991-1999) will be forwarded to RIHMI.

- The data base of Monthly Station Statistics (MONADS) as derived from CARDS database for 1991-1999, will be forwarded to RIHMI.

- The CARDS Derived Database of gridded monthly means for the period 1991-1997, after updating by Data from additional sources and CQC Version 2 processing, will be forwarded to RIHMI.

- The NCDC will update and send to RIHMI on a regular basis the annual additions to the Global Historical Climate Network data set (Version 2).

- A new version copy of COADS 1830-1997 be provided to RIHMI. This would include all the LMRF formatted observations and 2x2 monthly summary statistics.

- The U.S. side will send to the Russian side the snow cover data set of ten-days mean values

- The U.S. Side will forward the CD-ROMs with NCAR/NCEP Reanalysis Project Data Sets, as they will be issued, to Russian side.

- The daily and monthly river flow data for a separate list of stations (about 20 stations) over the U.S. territory, will be directed to the Russian side in 1999 or 2000.

- The monthly snow course data CD-ROM will be provided to Russian side.

- The soil temperature data set for approximately 100-110 stations on U.S. territory will be prepared and made available for joint analysis in 2000

From Russia to the U.S:

- The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.

- Observational upper-air Data for 1999, to be included into CARDS Database

- Information on Station Histories of Upper-Air Observations to be included into new versions of Joint Station History Database, if changes/updates occur.

- Soil temperature data set for 120 Russian stations

- Monthly CLIMAT messages for 1999 for 243 stations will be sent to NCDC.

- The daily river flow data (checked version) for a separate list of stations (about 20 stations) over the Russian territory, will be directed to the U.S. Side in 1999 or 2000.

- Russian side will forward to the U.S. Side the HRPT Data from NOAA Polar Orbital Meteorological Satellites as they are registered by reception station located in Yakutsk (if the problem of equipment updating will be resolved successfully).
- 3-hourly meteorological for about 223 internationally exchanged stations for 1991-1995 on modern PC-compatible media

- The final version of checked Baseline daily precipitation data set and metadata set.

Roy L. JENNE,
NCAR
Project 02.08-14
Leader from U.S. Side

Marsel SHAIMARDANOV,
RIHMI-WDC
Project 02.08-14
Leader from Russian Side
REPORT ON ACTIVITIES

1. Study of changes of probability of heavy precipitation has been conducted over the more than a half of the global land area including the United States and Russian Federation.

The areas of the world where analyses of one-day heavy precipitation events have been recently completed encompass North America, Australia, most of Eurasia and Africa, and several regions of South America. Over most of the land areas we found a disproportionate increase/decrease in heavy precipitation in recent decades compared to increase/decrease in mean precipitation during the “rainy” season. The rationale for this reaction of the typical daily precipitation distribution has been given by Groisman et al. [1999a]. Empirical data confirm this rationale. For example, for the eastern two-thirds of the contiguous U.S. we found a 17%/100yrs increase in the frequency of heavy precipitation (above 2 inches) during the 20th century, while mean summer precipitation totals during the same period have increased only by 7%/100yrs. So far we found only two types of statistically significant relationships among probability of a day with heavy precipitation (P_{heavy}) and changes in the probability of a day with precipitation (P_{pr}) and mean seasonal precipitation (μ):

1. |ΔP_{heavy} | / |Δμ| > |ΔP_{pr} | / |Δμ| ≥ 0; the signs of ΔP_{heavy}, ΔP_{pr}, and Δμ are the same or
2. ΔP_{heavy} > 0, while μ and P_{pr} do not change or decrease; the signs of ΔP_{heavy}, ΔP_{pr}, and Δμ can be different but only an increase in P_{heavy} was observed. These situations occur rarely.

Intensification of convective precipitation is the most probable cause [Sun and Groisman, 1999]. Over the contiguous U.S. the first type of changes in heavy precipitation has been documented for the past 100 years [Groisman et al. 1999a,b,c]. Over Siberia for the past 60 years the second type of changes in heavy precipitation has been documented by Sun and Groisman, [1999].

Related references and joint publications:


2. Joint efforts on quality control and analysis of baseline national data sets.

This core activity of both National Data Centers (RIHMI-WDC and NCDC), was successfully continued. Methodological aspects of national observational practice (cloudiness, precipitation, and temperature) have been addressed. A review paper has been published.

Related references and joint publications:


3. Analysis of the performance of contemporary global climate models using fine temporal resolution national data sets.

A series of studies has been conducted in assessment of interactions between cloud cover and other meteorological variables at the University of Massachusetts, USA and State Hydrological Institute, Russia using the in situ observations for the past 50 years over the Northern Hemisphere. We tested the performance of eight GCMs in reproduction of these interactions and found that some of these GCMs cannot reproduce even their sign. These studies became possible due the data exchange between NCDC and RIHMI of 3-hourly baseline synoptic data sets.

Related references and joint publications:


Sun, B.-M., P. Ya. Groisman, R. S. Bradley, and F. T. Keimig, 1999: Temporal Changes in the Observed Relationship between Cloud Cover and Surface Air Temperature (submitted to *J. Climate*).


These studies have been carried out at the Main Geophysical Observatory, St. Petersburg, Russia and The University of Massachusetts, USA. They also became possible due the data exchange between NCDC and RIHMI of 3-hourly baseline synoptic data sets.

Related references and joint publications:


**PLANS FOR 2000**

Two separate tasks will be pursued in the framework of the WG-8 Project 14.

**Task 1. MULTINATIONAL BASELINE DAILY TEMPERATURE AND PRECIPITATION DATA SET FOR GLOBAL CHANGE ASSESSMENTS**

This task has been supported by the NOAA-NASA Global Change Program for the 3-year-long period. Summary of the task is below.
Recent work has indicated that changes in daily maximum and minimum temperatures and precipitation have occurred in the U.S. and other parts of the world. Analyses of monthly averaged maximum and minimum temperatures have suggested that much of the warming in the global average temperature has been due to a greater increase in minimum temperature relative to maximum temperatures. The Intergovernmental Panel on Climatic Change (IPCC) assessments of seasonal/monthly precipitation show systematic changes that have occurred worldwide especially in the high latitudes (IPCC, 1990, 1996, 1998). However, monthly means tell only part of the story.

For agricultural and natural ecosystems as well as urban utility planners, it is the distribution of daily extreme values in maximum and minimum temperatures and precipitation that are of prime importance. Time series of the probability of heavy rainfall in many parts of the world have changed at a higher rate than mean monthly precipitation. Extremes in temperature and precipitation can have far reaching effects on both the environment and society and pilot studies indicate a proper documentation of their changes is warranted. Currently there is no unified global data set of all available daily temperatures and precipitation, and we propose to compile such a data set, including all available metadata, perform analyses, and make the data available to other researchers. Now we intend to make use of several collaborative projects launched recently to expand the existing in the USA and Russia daily data set to include most of Eurasia, Australia, North America, and Africa and a part of South America. We intend to create the baseline data set of daily temperature and precipitation that can be used for climate change assessments and model validations. Due to the absence of observations for some regions and/or political restrictions our data set can not be truly global. However, we shall collect and analyze the data of several target regions which represents more that 50% of the combined land. In these regions we have access to a sufficient amount of the lengthy (several decades at least) daily time series of temperature and precipitation and necessary metadata. We shall re-work these time series using unified quality control and adjustment procedures to make them useful for climatic change assessment. We shall also analyze the opportunity to correlate the temperature and precipitation fields available via the Global Telecommunication System, GTS, (about 8,000 sites for the past three decades) with our baseline data set in order to expand (if possible) the results valid for our target regions toward the full globe.

Task 2. "Sub-diurnal resolution baseline long-term data set of in situ meteorological observations for North America and Northern Eurasia".

This task is in the planning stage and below we cite our letter of Intent to submit a proposal to the NOAA Climate and Global Change Program Program Element: "Climate Change Data and Detection" with its objective to be achieved during the following three years (2000-2002).

Objectives:

Create a scientific-quality archive of high temporal (with a diurnal cycle resolution) and spatial (as dense as possible) homogeneous time series of major meteorological variables for North America and Northern Eurasia for the post-WWII period.

Rationale:

Questions have been raised more and more often about the specifics of the contemporary climatic change that cannot be answered using existing global meteorological data sets, such as Global Historical Climatology Network. Among these questions are:

- Changes in the structure of the diurnal cycle of surface air temperature, humidity, cloudiness, and precipitation; changes in convection processes over the land; changes in extreme and/or unusual events (hot/cold spells, heavy precipitation, flush floods, hurricanes, early/late frosts, etc.); and
- Verification and calibration of global climate models (GCMs) and new Earth observation systems (air- and satellite-borne instruments).

The answers to the first group of questions require access to hourly or 3-hourly meteorological data and a careful pre-processing of these data in order to retrieve reliable information about the changes in the diurnal cycle. A proper assessment of changes in land use around the station, observational practice, and instrumentation used as well as the sufficient level of the initial quality control provided by national meteorological services are essential prerequisites for accurate answers to these questions. The answers to the second group of questions require a high spatial resolution of the original station network used in the analyses due to small radii of correlation of the processes involved.
The above justifies the proposed Work Plan:

SubTask 1. Accumulate in situ meteorological data with at least four measurements per day for North America (up to 5,000 stations) and northern Eurasia (up to 2,500 stations) for the post-WWII period (or for the total available period of observations).

SubTask 2. Pre-process these archives to minimize the biases in surface air temperature, atmospheric pressure, humidity, wind, cloud and snow cover characteristics, and precipitation time series so that these data can be used in climate change assessments. This scientific quality data set will be then incorporated into an Integrated Surface Hourly Database that is currently under construction at NCDC.

SubTask 3. To use them for the climatological studies of changes in the structure of the diurnal cycle as well as changes in extreme and unusual weather events, and to verify the performance of modern GCMs and remote sensing algorithms. To prepare the archive for the next cycle of the IPCC-related studies.

Participant Institutions:

- U.S. National Climatic Data Center, Asheville, USA;
- Russian Research Institute for Hydrometeorological Information, Obninsk, Russia;
- Canadian Atmospheric Environment Service, Toronto, Canada.

Collaboration with Meteorological Services of PRC, Denmark, Iceland, Norway, Sweden, Finland, and The Netherlands is also expected.
Agenda - Meeting of the US-Russia Data Exchange  
(Under WG-VIII)  
(September 1998, NCAR, Boulder, CO, USA) 

Roy Jenne  
10 Sep 1998

SEPTEMBER 12, 1998, SATURDAY - Arrival in Denver at 8:04 P.M., Delta #1251  
- Russian colleagues arrive at airport (Marsel Shaimardanov & Alex Sterin)  
- Roy Jenne will meet them  
- Hotel: Staying at Golden Buff in Boulder (at 28th St. & Canyon Blvd.)

SEPTEMBER 14-18, 1998 – Meetings at NCAR  
Meeting location: The NCAR Mesa Building. Take Table Mesa Drive up the hill. Ask the receptionist inside the main door for the location of the meeting room.

SEPTEMBER 14, 1998, MONDAY  
1. 8:45 A.M.  Pick-up at hotel  
2. 9:15 A.M.  Welcome  
3. 9:30 A.M.  Discussion of agenda  
4. 9:40 A.M.  Dataset updates  (1 hour)  
   - Gus Shumbera  
   - Russian side  
   - Discussion and text  
5. 10:40  Break  
6. 11:00 A.M.  Exchange of marine ship data  (~ 30 minutes)  
   - Data exchanged – Steve Worley  
   - Progress of the COADS project  
   - Access to data on CD-ROMs  
   - Discussion of text  
7. 11:30 A.M.  Projects at Oak Ridge  
   - Talk by Robert Cushman, CDIAC  (30 minutes)  
   - 3 hr synop CD-ROMs, etc.  
   - Discussion and text  
8. 12:00 – 1:30  Lunch  
9. 1:30 P.M.  Project to copy Russian Surface Synop tapes  (1 hour)  
   Project to rescue precipitation data  
   - Number of tapes, schedule of project, etc.  
   - Comments by Gus Shumbera  
   - Comments by Russian side  
   - Impact of present problems  
   Support for RIHMI lab in Russia.  
   Discussion and text  
10. 2:30 P.M.  Proposals to digitize Russian marine ship data (30 min)  
     - Presentation by Russian side, and discussion
AGENDA FOR US-RUSSIAN DATA EXCHANGE MEETING

11. 3:00 P.M. Status of the NCEP/NCAR reanalysis (~ 30 minutes)
   - Review by Roy Jenne
   - Data on CD-ROMs

12. 3:30 P.M. New projects and data rescue proposed by Russian side
   - An introduction to more detailed discussions that will come later

Return to hotel

SEPTEMBER 15, 1998, TUESDAY

1. 9:15 A.M. Exchange of snow data (45 minutes)
   - Roger Barry
   - Discussion
   - Status of items for text

2. 10:00 A.M. Status of US mountain snow (20 minutes)
   - Roy Jenne
   - Discussion
   - Note: Mike Gillespie is not able to be here

3. 10:40 A.M. Exchange of river data (30 minutes)
   - Roy Jenne
   - Russian side
   - Discussion
   - Note: Jim Slack, USGS, is not able to attend

4. 11:10 A.M. Other current projects at NCDC/RIHMI
   - Gus Shumbera
   - Russian side

5. 12:00 – 1:30 Lunch

6. 1:30 P.M. Status of hydrology meeting in Russia
   Initial plans were for about Aug 1998. What is the present idea?

7. 1:45 P.M. The 8000 US Cooperative stations (70 minutes)
   - For long climate change
   - For local climate
     a) Talk by Nolan Doesken (Colorado State University) (45 minutes)
     b) Discussion
     c) Is there similar data in Russia? - Is it in central archives?

8. 3:00 P.M. Status of North Pole raobs
   - Gus Shumbera & Roy Jenne

Return to hotel
Tuesday evening, dinner at Red Lion
   6:40 P.M. – leave hotel
   7:00 P.M. – restaurant

SEPTEMBER 16, 1998, WEDNESDAY

1. 9:15 A.M. Higher level agreements for the exchange
   - WG-VIII is still in place
   - Changes in agencies in Russia
   - Information about climate change planning in Russia & US
   - Discussion
AGENDA FOR US-RUSSIAN DATA EXCHANGE MEETING

SEPTEMBER 16, 1998, WEDNESDAY (Continued)
2. 9:40 A.M. Oak Ridge Projects, a follow-up
   • Any more discussion
   • Review part of text
3. 10:00 A.M. Discussion of CARDS project
4. 10:30 A.M. Status of our text
5. 10:50 A.M. Projects and data rescue proposed by Russian side
6. 12:00 – 1:30 Lunch
7. 1:30 P.M. Continuation of discussion of projects for data rescue
8. 2:00 P.M. Presentation by Russian side (science topic) (1 hour)
9. 3:00 P.M. Location of rawinsonde stations

Return to hotel and shopping

SEPTEMBER 17, 1998, THURSDAY
1. 9:15 A.M. Review of text
   Drive to mountains and hike

SEPTEMBER 18, 1998, FRIDAY
1. 9:15 A.M. Complete the text
   Shopping

SEPTEMBER 19, 1998, SATURDAY
   Departure to Russia
   Leave Denver airport on Delta #1716 at 10:45 A.M.

Note 1: Gus Shumbera will be at the meetings Sep 14-16. He will be at another meeting Sep 17. He leaves Denver on Sep 18, about 11 A.M.

Note 2: Robert Cushman will be at the meetings Sep14, 15, and part of the morning of Sep 16.

Note 3: Nolan Doesken will attend the meeting on Tuesday, Sep 15.

Note 4: Roger Barry will attend the meetings on Tuesday, Sep 15.
Report of the
Data Exchange Coordinators Meeting
(Boulder, Colorado, 14-18 September 1998)

This meeting was held under the bilateral program:
U.S. - Russia Agreement on Cooperation in the Field of Protection of
the Environment and Natural Resources

Working Group VIII:
The Influence of Environmental Changes on Climate

PROJECT 02.08-14: Data Exchange Management

DATA EXCHANGE COORDINATORS MEETING
(Boulder, Colorado, 14-18 September 1998)

(IMPLEMENTATION REPORT AND PLANS FOR 1999)

Participants in the Meeting:

a. Russian Side
   Marsel Shaimardanov, Director RIHMI-WDCB
   Alexander Sterin, RIHMI-WDCB

b. US Side
   Roy Jenne, NCAR
   August Shumbera, Director WDCA for Meteorology
   Robert Cushman, Director Carbon Dioxide Info Analysis Center
   Roger Barry, Director SNIDC (WDC-A, Snow and Ice), Boulder, CO
   Nolan Doesken, Asst. State Climatologist, Colorado (CSU)
   Dennis Joseph, NCAR
   Steve Worley, NCAR
   Joey Comeaux, NCAR
REPORT ON IMPLEMENTATION

EXCHANGE OF SCIENTISTS:

During 17-25 August 1997, the US specialists Roy Jenne, August Shumbera and Mike Gillespie visited RIHMI-WDCB Obninsk Russia, to discuss the results of bilateral Data Exchanges in 1996-97 and plans for future exchanges in 1998.


Dr. Oleg Alduchov was invited to NCDC in August 1998 for a period of 28 days to take part in improvement of U/A Data Complex Quality Control (CQC), in analysis of CQC errors and to participate in CARDS Project meeting.

Other bilateral visits of specialists may occur at late 1998 if funding permits.

JOINT COLLABORATION:

1. Upper-Air Data Cooperation (CARDS Project)

In 1997-1998, the US and Russian Scientists continued to build the Comprehensive Aerological Reference Data Set (CARDS). Dr. Oleg Alduchov was invited to NCDC in August 1998 for a period of 28 days to take part in improvement of U/A Data Complex Quality Control (CQC), in analysis of CQC errors and to participate in CARDS Project meeting.

Russian side provided to US Side the Upper-Air Data for 1991-1996, to be appended to new version of CARDS Database in 1997. This CARDS Observational Database, for period 1991-1997, which will be processed by CQC version 2 software, will become available to Russian Side in late 1998.

The job for the goals of temperature correction model on determination of bases, tops and cloud amounts for low, medium, and high clouds from radiosonde soundings, is also performed in the framework of this activity.

The jobs on CARDS Database Analysis and preparing Upper-Air Informational Products, as well as jobs on CQC and cloud data adjustment, were continuing in late 1997-1998. The Russian Side has prepared the Data Base of Monthly Station Statistics, which were based on CARDS Observational Database version 2, for the period 1948-1990, and forwarded these Data to NCDC at late 1997. The Data Base of Monthly Station Statistics, which were based on CARDS Observational Database version 2, for the period 1948-1990, but contained more non-missing humidity parameters, was forwarded to the U.S. Side in September 1998.

Publications were prepared jointly on CARDS-derived Monthly Station Statistics Database and on comparison between CARDS and Reanalysis monthly Data of U/A temperature.

Both sides consider the issue of joint CD-ROMs containing CARDS Upper-Air Derivatives, such as Monthly Station Statistics Data, and other.

Both sides continued their efforts to produce, check, correct and to update the combined Upper-Air Station History Database.

2. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological
Information (RIHMI). Future exchange activities will include updating those data sets previously exchanged, with more current data. During 1997-98, several activities have taken place.

Russian Side prepared and forwarded to the U.S. Side in 1997-1998:

- The RIHMI provided to NOAA/NCDC the monthly CLIMAT Reports for 243 fUSSR stations for 1997
- The Daily Snow Depth Data Set (STOS) for 1985-1995 for 222 fUSSR Stations

U.S. side prepared and forwarded to Russia in 1997-1998:
- GHCN version 2 dataset

3. Marine Meteorological Data

The COADS project is a U.S. project involving a partnership of U.S. organizations working to update and improve the global surface marine database of ship and buoy observations, which then become available to the worldwide research community. International contributions are an important aspect of the project without which the database could not be updated to such a global extent. Over the years RIHMI working through Working Group VIII has provided extensive input records to the COADS database and in return the COADS data have been provided back to Russia. The records received from RIHMI are a valuable and significant component of COADS and future contributions are being sought to further improve the database.

During late 1996 and 1997 major portions of COADS were reprocessed in support of the NCEP/NCAR Reanalysis Project. Individual marine reports were reprocessed for 1950-1979 (Release 1b) and corresponding 2-degree latitude by 2-degree longitude monthly summaries produced. With the support from NOAA's Office of Global Programs and in collaboration with the UK Met Office, an International Workshop on Digitization and Preparation of Historical Surface Marine Data and Metadata was organized and held on 15-17 September 1997 in Toledo, Spain. The Proceedings from this workshop are in press as a WMO technical report and will also appear in electronic form on the Web. One important presentation at the workshop from WDC-B Russia, and revised proposals presented at the Data Exchange Coordinators Meeting in Boulder, Colorado, 14-18 September, 1998, described the existing number of marine observations in the Russian archives that require digitizing and rescue from aging magnetic media. These data will be valuable to add to COADS and discussions have been held as to how necessary resources could be obtained to key and to rescue the data.

No new marine surface data were exchanged during 1997. In order to improve upon this situation NCAR started experimenting with providing COADS data on CD-ROMs to Russia. CD-ROMs are being evaluated as means for providing future COADS updates. First the COADS MSTD Group 3 (statistical summaries in 2x2 latitude/longitude boxes) data for 1854-1995 were delivered (December 1997) and successfully accessed in Russia. Building on this success a second CD-ROM was created at NCAR and delivered to Russia in April 1998. The data content of this CD-ROM was more complex. It contained COADS observations and MORMET data.

4. River Flow Data

In 1997-98, Russian side continued to work with the data set of mean monthly and mean annual river flow data from the US side – USGS, that were prepared through 1995-96 and exchanged to Russian side in August 1996, and had got certain experience in working with these data.

Additionally, Russian side prepared the data set of river flow data, both daily and monthly, for a set of 22 stations of the European part of Russia. This data set was provided to the U.S. side in September 1998.

5. Snow Data

The bilateral cooperation on improving of the exchanged in 1996-97 data sets and analyses of snow cover conditions continued in 1997-98, between WDC-A for Glaciology (Snow and Ice), from the U.S.side, and Institute of Geography and RIHMI, from Russian side. Snow cover data sets were prepared in both countries.
6. Mountain Snow Data

Both sides continued to study the methods they use for mountain snow data collection and archiving. The U.S. side informed about their experience in this issue.

The US has manual snow course data for about 1000 places. These are visited periodically during the winter season to measure the depth of snow and the amount of water in the snow. The snow survey has plans (in Aug 1998) to place all of these data for the period of record onto a CD-ROM by Dec 1998.

In addition, there are daily data from about 650 Snotel sites in the western US. These stations give measurements of the weight of snow on top of a large snow pillow. They also measure daily precipitation (frozen or water) and temperature. There are also plans to put these data onto a CD-ROM, but people want to work on some data quality issues before that is done.

7. Preparation of Bias-Free Data Sets

During 1997-1998, the work on developing bias-free data sets continued at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention is given to improving daily minimum, maximum, and mean temperature and pressure and daily precipitation data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades. Both NOAA/NCDC and RIHMI scientists will continue their work on the basis of these data. Investigation of the changes in extreme climatic events is considered as a main goal of this work in the nearest one-two years.

8. Global Water Cycle

A more detailed version of this part program (the publications, the plans) is in Attachment I.

9. Soil Temperature Data Project

The creation and exchange of soil temperature data sets both for Russia and the USA was discussed during Roger Barry's visit to RIHMI-WDC in July 1997. Both sides expressed interest in the exchange of these data, and in research involving these data. The main goal of this project is to organize soil temperature data sets for Russia and North America, to exchange the data for intercomparison and to undertake a joint assessment of soil temperature variations for the 2 countries. Such time series will provide a baseline for global change studies. A list of soil temperature stations (120 stations) in the USSR that can be digitized is available, based on discussions between Dr. Barry and the Soils Institute, RAS, Pushchino. A few stations started around 1900.

10. Translated Abstracts of Russian-Language Climate Change Publications

The Carbon Dioxide Information Analysis Center (CDIAC) at the U.S. Department of Energy's Oak Ridge National Laboratory, in collaboration with the All-Russian Research Institute for Hydrometeorological Information-World Data Center (RIHMI-WDC) completed the fourth volume of the translation series of Russian-language climate-change literature. This volume, "Selected Translated Abstracts of Russian-Language Climate-Change Publications: IV. General Circulation Models (ORNL/CDIAC-94; Proceedings of RIHMI-WDC, Issue 165)" completes the series. The entire series is now available both in print and online (http://cdiac.esd.orl.gov/epubs/cdiac/russengl.html).

11. Numeric Data Packages (NDPs)

CDIAC, in cooperation with the National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) - World Data Center, Obninsk, updated "Six- and Three-hourly Meteorological Observations from 223 U.S.S.R. Stations" (ORNL/CDIAC-108, NDP-048). This database contains 6-and 3-hourly meteorological observations from a 223-station network of the former Soviet Union. The first version of this database extended through the mid-1980s (ending year depended upon station) and was made available in 1995 by CDIAC as NDP-048. The update of the database includes data through 1990. Station records consist of 6-and 3-hourly observations of some 24
meteorological variables including temperature, past and present weather type, precipitation amount, cloud amount and type, sea level pressure, relative humidity, and wind direction and speed. The 6-hourly observations extend from 1936 through 1965; the 3-hourly observations extend from 1966 through 1990. These data have undergone extensive quality assurance checks by RIHMI-WDC, NCDC, and CDIAC.

CDIAC published a 5-CD set based on NDP-048 and distributed five sets to the Russian side and interested scientists (to complement online data available from CDIAC's web page).

12. Satellite Data Management

In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) have started to be received and registered at points of Yakutsk and Khabarovsk. The US provided on-land facilities for these goals.

Both sides arranged, in parallel, Databases of the HRPT Data registered in Yakutsk. By August 1997, 103 DAT tapes with HRPT data from Yakutsk, were transferred to the US side (for EROS Data Center in South Dakota).

The US Side provided DAT tape drive and, partly, DAT tapes for these data exchanges.

The exchanges continued at late 1997 and early 1998. Problems of tape compatibility arise. Both sides will do their best to resolve them.

13. Development of Telecommunications

Both sides agree that telecommunications become more and more powerful tool for climate data and information exchanges.

Both sides believe that access of RIHMI-WDC to INTERNET facilities, which was provided in the middle of 1997, is extremely useful for bilateral cooperation and for advanced Data exchange activity. RIHMI-WDC has got certain opportunities to obtain climate data via FTP and WWW. However, considering the role of RIHMI as of World Data Center, the current capacity of these facilities is not sufficient and should be considered as the beginning one. The further development of these opportunities for RIHMI-WDC as that for the World Data Center, that could increase the FTP access speed and to increase the volumes of data available for bilateral exchanges via telecommunications, is highly significant for both sides.

Russian side prepared a proposal on Development of Telecommunications. It was discussed at Data Coordinators Meeting in 1998.

14. Precipitation Data Rescue Project

A project to rescue precipitation data at RIHMI has been initiated in 1998 and to be continued during 1999-2000. The project activities in the period of consideration included:

1. The rescue of data on about 10,000 aging 9-track magnetic tapes to newer media has started,
2. The digitization of precipitation data stored on manuscripts, and
3. The exchange of these data between Russia and the USA.

The first version of the daily precipitation data set (raw data) is prepared and sent to the US in September 1998. It will be checked and examined by both NCDC and RIHMI specialists.

15. Preparation of North Pole Rawinsonde Station Data

The Russian side took surface and upper air observations from a series of ice island stations for about 1954-1990. It was a great achievement by the observers to gather these important observations. Much of the surface data has already been prepared on a CD-ROM. The upper air (U/A) data is also very important for use in research.

About 1990, a dataset of only the lower levels of rawinsondes, and only one time per day (00 GMT) became available. Additional data, but not all, were added to the data set and an interim dataset was
prepared about March 1997. The data still had some serious problems with the date/time of soundings and in the merging of the upper and lower parts of rawinsonde soundings.

A more complete dataset of North Pole raobs were prepared by Russian colleagues. Data not previously included has been added to version 2 and an intensive quality control was performed. Some date/time control problems may still remain. A joint paper is being prepared to document this dataset. A sample of this dataset was provided to the U.S. side for review. Such review is still to be accomplished. The Russian side suggests that the data (version 3) should be made available to RIHMI and NCDC.

16. Fresh Water Ice Data

Under the collaborative work between GGI, St. Petersburg and WDC-A for Glaciology, data on freeze-up/break-up for 48 Russian Arctic draining rivers were digitized and transferred to WDC-A. Most records are for 1988-94 but for 7 stations they are longer, in some cases to the 1930s.

Further progress was not possible during 1997-98 due to limited funds. Dr. V. Vuglinsky, GGI, visited WDC-A for Glaciology in November 1997 to discuss the current work and potential future activities.

17. DATA EXCHANGES in 1997-1998

Forwarded to the U.S.:
In late 1997:

- The RIHMI provided their Upper-Air regional and GTS Databases (Data for 1996), to be appended to CARDS Data Base Version 2, during 1997.

- The RIHMI provided derived from CARDS observational Data Base, - Monthly Aerological Data Set, for the period 1948-1990, to NCDC/NOAA.

- DAT tapes containing HRPT Data from reception station in Yakutsk were transferred to U.S. side and are available now to both sides.

- The Data Set of Decadal (ten-days means) Snow Cover Data for 1970-1990 was forwarded to the U.S.

- The updated to 1994 and improved version of daily mean, minimum and maximum temperature and precipitation Data for 223 stations. This Version corresponds to NDP-040 Data Set.

- The Daily Snow Depth Data Set (STOS) for 1985-1990 for 222 Stations

In 1998:

- The RIHMI provided derived from CARDS observational Data Base, - Monthly Aerological Data Set, with extended non-missing humidity parameters, for the period 1948-1990, to NCDC/NOAA.

- The Data set on monthly mean river flow and daily river flow for separate stations of Russia (22 stations), provided in September 1998

- The daily Snow Depth Data Set (STOS) for 1985-1995 for 222 fUSSR stations

- The first portion of the baseline precipitation data set (daily precipitation stations for approximately 1000 Russian stations for 1985-1995), in September 1998

- The monthly mean pressure, humidity and sunshine time series for 1891 to 1995 for 243 fUSSR stations

- The RIHMI provided to NOAA/NCDC the monthly CLIMAT Reports for 243 fUSSR stations for 1997
Forwarded to Russia:


- The U.S. Side will provide CARDS-based monthly mean gridded data for the period 1991-97, to RIHMI-WDCB in late 1998.

- The U.S. Side provided in December 1997 a CD-ROM made at NCAR containing the 2x2 monthly statistical summaries for SST, AT, and humidity for 1854-1995 from COADS.

- The U.S. Side provided in May 1997 software (appropriate for Windows 95) to read a set of CD-ROMS create by PFEG/NMFS and presented to the Russian Side August 1996. These CD-ROMs contained COADS observations from Release 1 1854-1990.

- The U.S. Side provided in April 1998 a CD-ROM made at NCAR containing COADS and MORMET observations. Software and documentation were also provide on this test CD-ROM. The data were only small samples.


- The National Snow & Ice Data Centers CD-ROM containing Circumpolar Active Layer Permafrost System Version 1.0 was delivered to Russian side in September 1998.

- The National Snow & Ice Data Center's CD-ROM "Historical Arctic Rawinsonde Archive, Volume 5: 1992-June 1996" was provided to Russian side in September 1998.

- GHCN Version 2 Dataset was provided to Russian side in September 1998 (monthly precipitation).

**JOINT PUBLICATIONS:**


Data Exchanges – CODATA Conference, December 1997

Precipitation Project – CODATA Conference, December 1997


The other publications are listed in Attachment 1.
PLANS FOR 1999

PROJECT 02.08-14: DATA EXCHANGE MANAGEMENT

U.S. Project Leader: Roy Jenne (NCAR)
Russian Project Leader: Marsel Shaimardanov (RIHMI-WDCB)

1. Upper-Air Data Development

1.1 Comprehensive Aerological Reference Data Set (CARDS)

In 1998-99, U.S. and Russian scientists will continue to build the Comprehensive Aerological Reference Data Set (CARDS). Dr. Oleg Alduchov (RIHMI) will continue to enhance the CQC software during 1998-99, in Obninsk, Russia. The new version of CQC (version 3) has several advancements, first of all, will enable temporal check, in addition to the existing check procedures, and will be based on more detailed climatology. The new version of CQC was implemented at NCDC in 1998 to produce new versions of CARDS Database Version 3, which will become available as soon as possible to both sides.

Work will also continue to develop cloud models for the goals of cloud data control and cloud parameters reconstruction from CARDS Data. NCDC and RIHMI-WDCB will consider the issue of CD-ROMs with CARDS-based Data and Information as a significant result of this Joint Activity.

The new version of Station Monthly Statistics Database (MONADS Version 2), will be the output from the CARDS Database version 3. MONADS Version 3 will contain more extended list of statistics. Selected temperature change climatological analysis based on CARDS Data in comparisons with data on temperature from other sources, will be also continued in 1998-99.

Up to two RIHMI specialists may be invited to NCDC in late 1998-1999, if funding permits, for continuing and review of collaborative work on CARDS, and for outlines of future U/A Data and Climate Joint Activity.

In 1998-99, the Russian side will forward to the U.S.:
(1) The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.
(2) Observational upper-air Data for 1997 to be included into CARDS Database
(3) Information on Station Histories to be included into new versions of Joint Station History Database, if changes will occur.

In 1998-99, the U.S. side will forward to Russia:
(1) The CARDS database version 2 through 1997 processed by the Version 2 of CQC software.
(2) The CARDS Database output from CQC Version 3, for all the period through 1997
(3) The CARDS Station History Database versions as versions will be produced.
(4) Monthly gridded climatology products through 1997

Both sides believe that a publication on milestone concepts of CARDS as a Joint Project between NCDC and RIHMI, is desirable. WMO Bulletin is a possible issue for such publication. This publication is reasonable to contain the latest results obtained on CQC implementation and on Analysis and Product Developments.

1.2. U/A Climate Time Series Comparisons and Analyses

Both sides have begun their efforts on comparisons of U/A Climate parameters which are obtained from various sources (CARDS data of various spatial and temporal resolution, Satellite Data, Reanalysis Data, etc.).

Both sides believe that continued comparisons and joint analysis of climatic time series obtained for the atmosphere from various data types and by various authors, will become a reasonable continuation of joint activity on U/A data.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Alexander Sterin [RIHMI-WDCB])
2. Ship Data (COADS)

COADS observations and statistics for 1950-1979 have been upgraded. Currently, COADS observations and statistics for 1980-1995 are being upgraded along with additional year 1996 and possibly 1997. These data will be sent to RIHMI on CD-ROM media, as this media is considered acceptable for further exchanges.

Ongoing COADS work in 1998-99 involves updating Release 1a for 1980 through 1995 and extending the times series to 1996 and possibility 1997 (individual observations and 2-degree summaries). New data sources planned for inclusion are the preliminary versions of re-processed Global Telecommunication System (GTS) data, World Ocean Data Base (Levitus et al., 1998) oceanographic research vessel data, and preliminary 1980-96 data from the UK Meteorological Office's Main Marine Data Bank (MDB). This Release 1a update represents a first stage towards provision of data for two major upcoming international activities: 1) the atmospheric reanalysis projects in Europe and the U.S.; and 2) a blend of COADS and the UK Marine Data Bank (MDB), in support of the IPCC Scientific Assessment for the year 2000. The blending of COADS and the UK MDB will require reprocessing data for years 1854-1949.

The years 1854-1949 will be reprocessed to incorporate data from the UK Marine Data Bank, MORMET, and several other sources. This will be called Release 1c COADS and will not be available sooner than middle to late 1999. These data can be available to RIHMI when Release 1c is complete.

Both sides will do their best to provide efforts on digitizing and rescue of marine meteorological data that are collected at RIHMI-WDCB. These data could be an essential input to the future versions of COADS.

The Pacific Fisheries Environmental Group of the National Marine Fisheries Service (PFEG/NMFS) is producing a set of CD-ROMs containing the 1950-1995 COADS observations. This set of CD-ROMS will not contain the upgrades noted above. Three courtesy copies of this essential dataset from PFEG/NMFS for RIHMI will be provided in late 1998 or early 1999.

(U.S. PI: Steven Worley [NCAR], Joe Elms [NCDC], and Scott Woodruff [NOAA/OAR]; and Russian PI: Marsel Shaimardanov [RIHMI-WDCB])

3. River Data

U.S. side will provide a dataset of daily and monthly river flow data for U.S. stations in 1999.

Both sides believe that future efforts on river flow data exchanges, creation of joint datasets and on joint studies of river flow processes, are highly desired.

Both sides agree that a meeting between specialists of both countries to discuss snowpack measurement procedures, as well as streamflow measurements, archiving and forecasting procedures, could be arranged. Specialists from various agencies involved in these problems, could be participating this meeting. The possibilities on arrangement this meeting will be considered by both sides.

(U.S. PI: Roy Jenne [UCAR], Jim Slack [USGS] and Russian PI: Marsel Shaimardanov [RIHMI-WDCB])

4. Snow Data

The possibility of updating the Russian 10-day snow transect data into the 1990s and filling in some of the gaps in coverage in northeastern Siberia is under discussion between R.G. Barry and A.N. Krenke. Contingent on funding, it is proposed that this activity be continued at a modest level during 1999.

It is also agreed that development of this database back to at least 1950 would provide a valuable validation dataset for the various reanalysis projects. It would be desirable to use the existing record for approximately 1345 stations for 1966-1990 in order to establish the station coverage that is necessary to capture the main spatial patterns for this historical record. Funds for such an activity need to be identified.
US PI: Roger Barry (CIRES/WDC-A for Ice and Snow) and Russian PI: Vyacheslav Razuvaev (RIHMI-WDCB) and Alexander Krenke (Institute of Geography of Russian Academy of Science).

5. Soil Temperature Data Project

Soil temperature data, in regions with permanently or seasonally-frozen ground, are a significant indicator of changes in surface boundary condition. They are also important for the validation of climate models and in the parameterization of land surface modules in GCMs. It is essential, therefore, to organize data sets of soil temperature measurements.

The two sides have exchanged sample data sets and selected data have been issued on the CAPS CD-ROM (NSIDC, 1998). For 1999 it is planned to complete digitization of 130 station records from Russia at the Soils Institute, RAS, in Pushchino. NSIDC, in conjunction with the International Permafrost Association and WCRP-GCOS Terrestrial Observations Panel, is developing plans for a Circumpolar Active Layer Monitoring Network on maximum summer thaw depths. These data will be accessible via NSIDC. The US side will collaborate with Russian scientists in the QC and analysis of the temporal changes in soil temperature in relation to air temperature, precipitation and snow depth. It will also continue to assemble comparable data from North American sources as funds permit.

The soil temperature data will be used in GCM simulations for climate change scenarios by collaborators F. Nelson and O. Anisimov. It is proposed that the 130 Russian station archive be made available (CD and/or ftp) for release in late 1999. It is possible that a CAPS version -2 CD-ROM containing these and other new data sets could be issued.

Pls from Russia:
D. Gilichinsky, Soils Institute, RAS, Pushchino
N. Romanovskii, Geocryology Dept., Moscow State University
A.N. Krenke, Inst. Of Geography, RAS, Moscow,
V. Razuvayev, RIHMI-WDCB, and

Pls from USA:  R.G. Barry, NSIDC, University of Colorado,
F. Nelson, Geography Dept., SUNY, Albany, NY

6. Fresh Water Ice Data

The main goal of this activity is to exchange information on ice conditions on freshwater bodies. Such records have been shown to be a valuable indicator of changes in transition season temperature and are of intrinsic interest in relation to river flow in northern rivers, conditions for freshwater biota and so on. The total data volume is small but the information is currently not readily accessible.

During 1999, the US side (through NSIDC) expects to acquire an important database of freeze-up/break-up dates on lakes throughout North America and Scandinavia, especially. The records were assembled by an ad-hoc Lake Ice Analysis Group sponsored by the Limnology Center, University of Wisconsin under NSF support to Dr. J. Magnusson. The details of this database will be provided as they become available. In addition, an 80-year record of ice break up dates on the Nenana River, Fairbanks, Alaska, available at NSIDC, will be added. The data will be documented, formatted and QC'd and then made available for release.

Discussions between NSIDC and GGI, St. Petersburg will be continued in relation both to northern river ice records and any comparable lake ice data records. Funds need to be identified to maintain this activity.

(PI from Russian Side: Dr. V. Vuglinsky, GGI, St. Petersburg, Pls from U.S. Side: R. G. Barry, WDC-A for Glaciology, J. Magnusson - Center for Limnology, Univ. of Wisconsin)
7. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NCDC and RIHMI. Future exchange activities will include updating those data sets previously exchanged, with more current data. During 1998-99, several activities will take place.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

8. Preparation of Bias-Free Data Sets

During 1998-99, the work on developing bias-free data sets will continue at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention will be given to improving daily minimum, maximum, mean temperature and daily precipitation data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades and for the investigation of the changes in climatic extreme events. Both NOAA/NCDC and RIHMI scientists will continue work on the basis of these data sets.

(U.S. PI: Thomas Karl [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

9. Global Water Cycle

Please see Attachment 1 for information about the plans for this project.

10. Translated Abstracts of Russian-Language Climate-Change Publications

Both sides will consider the possible ways to continue activity on translated abstracts and its possible outputs. The continued cooperation between both sides with active participation of ORNL/CDIAC is highly desirable, with a focus on updating the 4-volume translated abstract series with more recent literature.

(U.S. PI: Robert Cushman [ORNL/CDIAC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

11. Numeric Data Packages (NDPs) and Data Publication

In cooperation with the Russian Research Institute of Hydrometeorological Information (RIHMI) – World Data Center, Obninsk, and NOAA’s National Climatic Data Center (NCDC), the Carbon Dioxide Informational Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) produced additional numeric data packages (NDPs) based on expanded versions of the 223-station Russian climate data sets.

The CDIAC numeric data packages NDP-048 (6- and 3-hourly meteorological observations) and NDP-040 (daily temperature and precipitation) for 223 Russian stations will be updated with newly available data.

Both sides believe that the Trends series (Trends '90, Trends '91, Trends '93 and Trends Online) is a good way to provide global change data and information to the research community and other users, and future continuation of this activity with participation of Russian specialists is reasonable. The continued cooperation between both sides, with active participation of ORNL/CDIAC, is highly desirable. Both sides have an interest in the inclusion of additional Russian climate data in Trends Online.

The development of telecommunications (see item 14) is highly desired as a good way to enhance Trends Online issues. Possible creation of distributed climate information data bases will be considered.

A synthesis of climate data from Russia and China should proceed, if the proposal "Development and Analysis of a High Quality Climate Data Base for the Former Soviet Union and The People's Republic of China" to the US/DOE by CDIAC, RIHMI-WDC, and the China Meteorological Administration, is funded.

(U.S. P.I.: Robert Cushman, Dale Kaiser [ORNL], Peter Steurer [NOAA/NCDC] and Russia P.I.: Marsel Shaimardanov, Vyacheslav Razuvaev, Alexander Sterin [RIHMI-WDCB])
12. Satellite Data Management

Both sides consider the need to continue on satellite data exchange. In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) received and registered at point of Yakutsk (Russia). The U.S. Side will consider the possibilities to partly support these activities.

(U.S. PI: Roy Jenne (NCAR), and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

13. Precipitation Data Rescue

The work for creation of the baseline precipitation data set will be continued in 1999. The complete assembly of daily precipitation (raw data) will be prepared in 1998-1999 on the basis of rewritten on newer media meteorological data files, and metadata will be gathered and presented as well as data files. The first version of the updated and checked baseline daily precipitation data set for the Russian territory will be prepared.

(PI from U.S.: August Shumbera (NCDC/NOAA) and PI from Russia Marsel Shaimardanov (RIHMI-WDCB)).

14. Development of Telecommunications

Both sides believe that access of RIHMI-WDC to INTERNET facilities, which was provided in the middle of 1997, is extremely useful for bilateral cooperation and for advanced Data exchange activity. RIHMI-WDC has got certain opportunities to obtain climate data via FTP and WWW. However, considering the role of RIHMI as of World Data Center, the current capacity of these facilities is not sufficient and should be considered as the beginning one. The further development of these opportunities for RIHMI-WDC as that for the World Data Center, that could increase the FTP access speed and to increase the volumes of data available for bilateral exchanges via telecommunications. It is highly significant for both sides.

Both sides will consider possible increase of telecommunications capacities of RIHMI-WDC as of World Data Center. To provide wider access to existing INTERNET resources in Global Changes, Global Changes Data, to Climate Data, Information and Climate Products, both sides plan to exchange their lists of known, non-depending on country, Web Sites, which contain such information. Further actions on this will be considered after this first step in sharing the experience in telecommunications.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

15. Mountain Snow and Ice Activity.

Both sides reviewed existing data sets on mountain snow and ice. The methods of mountain snow and ice measurements, used by each of sides, were also reviewed and discussed.

The US Data set is currently in digital format, while the Russian data set has not yet been digitized. The US Side agrees that monthly snow course data will be published on CD-ROM by about December 1998. This CD-ROM will be provided to the Russian side. Daily snow Data, collected through the SNOTEL network, will be made available to the Russian side on the CD-ROM after approximately, 2 years.

Both sides agree to consider the possible ways to provide the digitizing the data of Russian side on Snow and Ice in mountains.

Both sides agree that a meeting between specialists of both countries to discuss snowpack measurement procedures, as well as streamflow forecasting procedures, could be arranged. Specialists from various agencies involved in these problems, could be participating this meeting.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDC))
16. Extreme Climatic Events

The joint work for the study of the changes of extreme climatic events will be continued in 1999. The special attention will be paid for the investigation of the changes in precipitation regime and heavy rainfall occurrence. It is proposed to use the new baseline daily precipitation data set for the Russian and the U.S. area for this purpose. The possibility of the preparation of the special pluviograph data set for the study of the changes in heavy rain fall occurrence is considered now in RIHMI.

(U.S. PI: Tom Karl, Pavel Groisman [NCDC] and Russian P.I.: Marsel Shaimardanov, Vyacheslav Razuvaev [RIHMI])

17. Preparation of North Pole Station Data

Contingent on availability of funding, the U.S. side will consider inviting two or three Russian specialists to deliver and discuss the dataset. The dataset would be reviewed for remaining date/time control problems and if any problems are detected, the Russian colleagues would correct these. A final version would be made available to both sides.

(PIs US: August L. Shumbera, Jr. [NCDC]; Russia: Dr. Nina Zaitseva [CAO], Dr. Andrey Nagurny [AARI]).

18. Data Coordinator’s Meeting

The next meeting of the data coordinators will be held at Russia on July-October 1999. Up to three (3) specialists from U.S. will be invited for up to seven (7) days.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])

19. Additional Exchange of Scientists

Specialists from Russia have presented papers to 23 Annual Climate Diagnostics and Prediction Workshop in Florida USA, in October 1998. The papers are accepted by Workshop Committee and are included in Poster Sessions. Search of any available possibilities in participating such Meetings is recommended, as they are very significant for specialists from both sides.

Up to three specialists from Russia could participate the 24 Annual Climate Diagnostics and Prediction Workshop in U.S. in late 1999.

Up to two RIHMI specialists may be invited to NCDC in late 1998-1999, for continuing and review of collaborative work on CARDS.

Pending the availability of funds, additional reciprocal visits of Russian and U.S. specialists will be considered for participation in international and bilateral meetings. This will support the activities conducted within the framework of Project 14.

(U.S. PI: Roy Jenne [NCAR] and Russian PI: Marsel Shaimardanov [All-Russian RIHMI])

20. Future Activities on Climatic Data Exchange Management.

Both sides believe that Climatic Data Exchange Management upon the Project 14 of Working Group 8 is developing sustainably and is a good sample of mutually effective joint cooperation between both countries. Both sides believe that there exists a strong need to continue bilateral activity on Climatic Data Exchange Management.

Both sides believe it necessary to continue and strengthen the activities of Working Group VIII: The Influence of Environmental Changes on Climate, under U.S.-Russia Agreement on Cooperation in the Field of Protection of the Environment and Natural Resources.
SUMMARY OF PLANNED 1998-99 DATA EXCHANGES

From the U.S. to Russia:

- The CARDS database Version 2 Data for period through 1997, as data from additional sources are appended and processed jointly with existing data by the Version 2 CQC Software, will be forwarded to RIHMI.

- The later version of CARDS Database Data (CQC Version 3 Outputs through 1997) as soon as they will be completed, will be forwarded to RIHMI.

- The CARDS Derived Database of gridded monthly means for the period 1991-1997, after updating by Data from additional sources and CQC Version 2 processing, will be forwarded to RIHMI.

- The NCDC will update and send to RIHMI on a regular basis the annual additions to the Global Historical Climate Network data set (Version 2).

- The U.S. side will send to RIHMI the updates to COADS Release 1a, b and c observational and statistics Data.

- A copy of Marine Fisheries CD-ROMs with COADS data will be provided to Russian side.

- As soon as COADS Release 2 will be prepared, it will be forwarded to Russian side.

- NCAR will send to RIHMI six-hourly and three-hourly synoptic observations data set for the Worldnet stations for the period 1988-1996.

- NCDC will send to RIHMI the snow cover data set of ten-days mean values.

- The U.S. Side will forward the CD-ROMs with NCAR/NCEP Reanalysis Project Data Sets, as they will be issued, to Russian side.

- The daily and monthly river flow data for a separate list of stations (about 20 stations) over the U.S. territory, will be directed to the Russian side in 1999.

- The monthly snow course data CD-ROM will be provided to Russian side.

From Russia to the U.S.:

- The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.

- Upper-Air Informational Climatic Products, including monthly statistics, as they are obtained from CARDS Databases.

- Observational upper-air Data for 1997, to be included into CARDS Database.

- Information on Station Histories of Upper-Air Observations to be included into new versions of Joint Station History Database.

- Three-hourly meteorological data sets for 223 stations will be updated to 1995.

- Monthly CLIMAT messages for 1998 for 243 stations will be sent to NCDC.
• The daily river flow data (checked version) for a separate list of stations (about 20 stations) over the Russian territory, will be directed to the U.S. Side in 1999.

• Russian side will forward to the U.S. Side the HRPT Data from NOAA Polar Orbital Meteorological Satellites as they are registered by reception stations located in Yakutsk.

• The first version of checked Baseline daily precipitation data set.

Roy L. JENNE,
NCAR
Project 02.08-14
Leader from U.S. Side

Marsel SHAIMARDANOV,
RIHMI-WDC
Project 02.08-14
Leader from Russian Side

GLOBAL WATER CYCLE RESEARCH
A new method of evaluation of vertical turbulent heat fluxes using standard meteorological observations in Eurasia was developed and tested. This will allow us to construct time series of sensible heat fluxes with a 3-6-hourly time resolution for several past decades over the former Soviet Union, China, and several other countries. For the former Soviet Union this has already been done and trends in these time series have been revealed and evaluated.

An archive of several decades of synoptic meteorological data with diurnal cycle resolution from more than 1500 stations of the Northern Hemispheric land areas has been compiled and used for evaluation of the overall cloud and snow cover effects on near-surface air temperature, humidity, and sensible heat fluxes and for testing the ability of seven global climate models, GCMs, to reproduce these effects in contemporary climate. It was argued that only those GCMs that passed this test (and some of them did not) can be reliably used in climate sensitivity/change studies.

A relatively new development in this Project is an estimation of the residual term of the cloud effect on surface air temperature, $\partial T/\partial C$, after associated contributions to $T$ by atmospheric humidity and snow on the ground have been accounted for. In the daytime over the large areas, this term is found to be invariable in the marsh of seasons, geographically, and at the interannual/interdecadal time scales. This value of $\partial T/\partial C = -0.75 \pm 0.1 \text{K(tenth of cloud cover)}$ can be considered as an empirical estimate of the radiative daytime cloud forcing.

Using the data accumulated during the project, a simple statistical model that describes the behaviour of daily precipitation distribution, when the mean precipitation is changing, has been developed. This model applied to the data of eight countries over three continents shows that the shape parameter of the precipitation distribution remains regionally and temporally stable, the number of days with precipitation remains more or less stable, while the scale parameter is highly variable in time and space. This implies a likelihood that changes in mean monthly precipitation in these countries will be associated with disproportionately large changes in the extremes. Our results indicate that in a warmer and wetter world, as projected by climate models driven by increasing greenhouse gases, increases in heavy precipitation are likely to be disproportionately large compared to any change in the total precipitation. This is likely to have important socio-economic and ecological impacts. This feature of summer precipitation may already be manifested in recent increases in precipitation extremes over some regions, e.g., the United States and Australia.

The results of the Project have been published in six papers in refereed journals/book chapters, two papers are in the review process and two papers are in preparation. They have been presented at seven International Conferences. Final presentations of the results are expected to be done at the next AMS Conference (Dallas, TX; January 1999) and the IUGG Assembly (Birmingham, United Kingdom; July 1999).
References:

Papers in refereed journals:

Papers in the review process.

Papers in preparation for refereed journal publication:

Conference papers:

Groisman, P.Ya., Bradley, R.S., Sun, B.-M. and Sporyshev, P., 1997; "Internal consistency of cloud and snow cover parameterizations in the GCMs: Comparison with empirical data". Results have been presented at the Ninth Symposium on Global Change Studies, 11-16 January, 1998, Phoenix, Arizona.


Report of the
Data Exchange Coordinators Meeting
(Obninsk, Russia, 17-25 August 1997)

This meeting was held under the bilateral program:
U.S. - Russia Agreement on Cooperation in the Field of Protection of
the Environment and Natural Resources

Working Group VIII:
The Influence of Environmental Changes on Climate

PROJECT 02.08-14: Data Exchange Management

DATA EXCHANGE COORDINATORS MEETING
(Obninsk, Russia, 17-25 August 1997)

(IMPLEMENTATION REPORT AND PLANS FOR 1998)

Participants in the Meeting:

a. Russian Side
   Marsel Shaimardanov, Director RIHMI-WDCB
   Nikolai Kovalev, RIHMI-WDCB
   Alexander Sterin, RIHMI-WDCB
   Vyacheslav Razuvaev,
   Vitalii Pugolovkin
   Irina Gotovchenkova,
   Raphael Martuganov,
   Oleg Alduchov,
   Irina Chernikh,
   Yuiri Gemish,
   Vasilli Sobolev,
   Yelena Svishcheva,
   Nina Zaitseva (Central Aerological Observatory)
   Andrei Nagurnii (AARII)
   Vladimir Radionov (AARII)
   Oleg Sirotenko (Russian Research Institute of Agricultural Meteorology)
   Vladimir Mukhin (Russian Hydrometeorological Center)

b. US Side
   Roy Jenne, NCAR
   August Shumbera, Director WDCA for Meteorology
   Mike Gillespie, NRCS  (Snow Survey, Dept. of Agriculture)
REPORT ON IMPLEMENTATION

EXCHANGE OF SCIENTISTS:
During 03-10 August 1996, Drs Marsel Shaimardanov and Alexander Sterin from Russia, visited NCAR, Boulder, CO, to discuss the results of bilateral Data Exchanges in 1995-96 and plans for future exchanges in 1997.

During 17-25 August 1997, the US specialists Roy Jenne, August Shumbara and Mike Gillespie visited RIHMI-WDCB Obninsk Russia, to discuss the results of bilateral Data Exchanges in 1996-97 and plans for future exchanges in 1998.

Dr. Oleg Alduchov was invited to NCDC in August 1996 for a period of 45 days to take part in improvement of U/A Data Quality Control (CQC), in analysis of CQC errors and to participate in obtaining CARDS Version 2 Data Base that became available to both sides.

Since September 1996, Dr. Pavel Groisman (State Hydrological Institute) became a visiting scientist for one year under the UCAR Visiting Scientist Program.

Two specialists from Russia (Dr. Gennadii Menzulin from State Hydrological Institute and Dr. Alexander Sterin from RIHMI-WDCB) participated at 21st Annual Climate Diagnostics and Prediction Workshop in Huntsville, Alabama, in October 1996. This meeting was used for discussing the status of preparation of baseline data sets for climate research.

During 3-6 June 1997, Drs. Vyacheslav Razuaev (RIHMI-WDC) and Georgij Gruza (IGCE) attended the International Workshop on Indexes and Indicators for Change of Extreme Climate Events, Asheville, NC, USA.

Dr. Roger Barry (NSIDC USA), visited WDC-B1, Obninsk, Russia, in July 1997. This enabled discussions on ongoing snow cover, soil temperature and the proposed precipitation time series projects.

Other bilateral visits of specialists may occur at late 1997 if funding permits.

JOINT COLLABORATION:

1. Upper-Air Data Cooperation (CARDS Project)

In 1996-1997, the US and Russian Scientists continued to build the Comprehensive Aerological Reference Data Set (CARDS). Dr. Oleg Alduchov was invited to attend NCDC in August 1996, for a period of 45 days, to take part in improvement of U/A Data Complex Quality Control (CQC), in analysis of CQC errors and to participate in obtaining CARDS Version 2 Data Base. This Version of CARDS Data Base, for the period 1948-1990, became available to both sides.

Russian side provided to US Side the Upper-Air Data for 1991-1996, to be appended to new version of CARDS Database in 1997. This CARDS Observational Database, for period 1991-1996, which will be processed by CQC version 2 software, will become available to Russian Side in 1997.

The job for the goals of temperature correction model on determination of bases, tops and cloud amounts for low, medium, and high clouds from radiosonde soundings, is also performed in the framework of this activity.

The jobs on CARDS Database Analysis and preparing Upper-Air Informational Products, as well as jobs on CQC and cloud data adjustment, were continuing in late 1996-1997. The Russian Side has prepared the Data Base of Monthly Station Statistics, which were based on CARDS Observational Database version 2, for the period 1967-1989, and forwarded these Data to NCDC. The Monthly Station Statistics Database for 1990 and for 1946-1966, will be prepared and will be forwarded to NCDC in 1997.

Gridded U/A Data were produced at NCDC in parallel to the process of calculating the CQC Version 2 Data. These gridded U/A Data, as well as their Monthly Means, were transferred to RIHMI-WDC.

Publications were prepared jointly on CARDS-derived Monthly Station Statistics Database and on comparison between CARDS and Reanalysis monthly Data of U/A temperature.

Both sides consider the issue of joint CD ROMs containing CARDS Upper-Air Derivatives, such as Monthly Station Statistics Data, or other.

Both sides continued their efforts to produce, check, correct and to update the combined Upper-Air Station History Database.

2. Update of Exchanged Meteorological Data Sets
Over the last several years, there has been an active data exchange between NOAA’s National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Future exchange activities will include updating those data sets previously exchanged, with more current data. During 1996-97, several activities have taken place.

Russian Side prepared and forwarded to the U.S. Side in 1996-1997:

- The updated to 1994 and improved version of daily mean, minimum and maximum temperature and precipitation Data for 223 stations. This Version corresponds to NDP-040 Data Set.
- The RIHMI provided to NOAA/NCDC the monthly CLIMAT Reports for 243 USSR stations for 1995 and 1996
- The Daily Snow Depth Data Set (STOS) for 1985-1990 for 222 Stations

3. Marine Meteorological and Aerological Data

The COADS project is a U.S. project involving a partnership of U.S. organizations working to update and improve its global surface marine baseline database of ship and buoy reports which then becomes available to the worldwide research community. In July 1996 RIHMI shipped to the U.S. the magnetic tape containing about 600,000 marine meteorological observations (data from Russian ships). Also, the latest version of the archive which contains 102,000 marine upper-air observations, is sent to the U.S. side.

Russian side is interested in producing CD-ROMs containing COADS updates to Version 1 and 1a and intermediate releases, as well as COADS Version 2 Data (both observational Data and statistics) and in receiving these CD-ROMs.

Roy Mendelsohn (National Marine Fisheries Service, Pacific Fisheries Environmental Group), along with NCAR, NOAA/ERL Boulder, and NOAA/NCDC Asheville have produced a CD-ROM set (5 CDs) containing the Release 1 plus interim (1854-1990) COADS observations. The data on the CD-ROMs is the same format as the primary archives at NCAR. These CD-ROMs provide convenient software to select data by parameter. Funding is being sought to continue this cooperative project with the end result being a set of CD-ROMs for COADS Release 1a (1980-1995). The Release 1 CD-ROMs are available for exchange now, and forthcoming CD-ROMs will also be available for data exchange when they are completed.

One set of these COADS CD-ROMs (5 CD's each) was presented to the Russian side in Aug 1996. This archive contains about 100,000,000 marine meteorological observations, including data that were earlier transferred by Russian Side to the U.S. Side. The archive on the CD contains many parameters, but only four parameters are easy to access: water temperature, air temperature, air pressure, wind. Russian Side got a certain experience in access to these data.

During late 1996 and early 1997 major portions of COADS were reprocessed so as to provide upgraded input for the NCAR/NCEP Global Atmospheric Reanalysis project. The period 1990-1993 from COADS Release 1a was reprocessed to incorporated additional data previously not available. At the same time 1994-1995 were processed as an extension to Release 1a. The period 1950-1979 was also reprocessed. This effort is designated COADS Release 1b and serves to upgrade and replace the original processing for these years in COADS Release 1.

The marine surface data from RIHMI has now been included into COADS for the period 1950-1995. Data for 1854-1949 (COADS Release 1) and 1980-1989 (COADS Release 1a) remains unchanged.

The plans of U.S. Side for the remainder of 1997 and 1998 include reworking the 1854-1949 time period in conjunction with an effort to merge COADS with the UK Marine Data Bank (UKMDB). The UKMDB and COADS each individually have unique records so a merger will create an even more complete global dataset. Upon completion this will be call COADS Release 1c. The marine surface data from RIHMI will be added to COADS Release 1c. U.S. Side's proposal is to make a COADS Release 2 version targetted at a date after the completion of Release 1c. This Release will be a reprocessing of the full period of record in COADS and will not be available until 1999 or later.
A data tape from RIHMI was delivered to NCAR in August 1996. It contained over 600,000 marine surface reports which overlapped existing years in the RIHMI archive and included a few reports from 1993 and 1994. A CD-ROM version of COADS Release 1 1854-1991 was provided to the RIHMI representatives at the Working Group Meeting in 1996. These data are accessible with standard COADS software as is appropriate for other data delivered on tape. A PC Windows95 access to the CD-ROM archive was provided to RIHMI in May 1997.

Several new pieces of COADS are now available for exchange with RIHMI. They are the 1990-1995 upgrade and extension of COADS Release 1a, and the 1950-1979 upgrade of COADS Release 1b. Individual observations and monthly summary statistics for these time periods are available. These upgrades are complete replacements for previously exchanged Release 1 and 1a data. Additional COADS data may be available on CD-ROM in 1998. The Pacific Fisheries Environmental Group of NOAA produced the set of CD-ROMs exchanged in 1996. This same group has been funded to produce a similar set of CD-ROMs using COADS Release 1a data for 1980-1995. NCAR can provide these CD-ROMs to RIHMI when they become available.

Currently, RIHMI has a vast collection of undigitized marine meteorological observations made on research vessels. These data are in logbooks that are collected mainly at RIHMI. The inventory of these data could help in best estimate of their quality and value for future research and to outline efforts in the digitizing these data.

4. River Flow Data

In 1996-97, Russian Side had worked with the data set of mean monthly and mean annual river flow data from the US Side - USGS (for a total of 454 rivers), that were prepared through 1995-96 and transferred to Russian Side in August 1996, and had got certain experience in working with these data. Russian Side, in response, is preparing the data set of mean monthly river flow data for several parts of territory of Russian Federation. This data set covers the period from the beginning of observations till 1985. It should be transferred to the U.S. Side in 1997. Also, Russian Side prepared an inventory of existing river data bases, including the information on their status, periods, time resolution, check efforts, media, etc. This information will be used for future planning of River Data Activity and for it's extension in future.

5. Snow Data

The bilateral cooperation and data exchange, and analyses of snow cover conditions continued in 1996-1997, between WDC-A for Glaciology (Snow and Ice), from the U.S. side, and Institute of Geography and RIHMI, from Russian side. Snow cover data sets are prepared in both countries. The U.S. sent to Russia a decadal (ten-days means) snow cover data set for approximately 500 sites on the U.S. area for 1971-1990 and Russia sent to the U.S. the set of corresponding spatial density for 1966-1990. During 1996 these data sets were checked for compatibility and quality in both countries and used for analysis of snow cover change in both countries. This work will be continued in 1997-1998. Special attention will be paid for updating for 1991-1994 and improving of the baseline daily snow depth data set for 178 Russian stations. A few stations started at around 1900. This data set is an important part of any work for comparison of snow cover change over two countries for long period. Both Data Sets on Snow are shipped by Russian Side to the US Side, on Summer 1996. The US side shipped to Russia the Historical Snow Depth Daily Data, Vol. 1, (1 CD-ROM set).

Snow course transects made at 10-day to monthly intervals at approximately 800 stations throughout the Former Soviet Union for 1966-90 are now being assembled, quality-checked and documented at NSIDC. The measurements provide snow cover liquid water equivalent data based on 0.5 to 2 km long transects in fields or forests. The project has benefited from Professor A. Krenke's tenure of a Fulbright Fellowship at WDC-A for Glaciology during January- August 1997. Professor Barry visited RIHMI and the Institute of Geography, RAS in July 1997 to review progress. Joint publications are in preparation and several related analyses have been published.

In cooperation with Environmental Research Institute, University of Michigan, AARI has prepared archives of ten days and monthly snow cover parameters (depth, density and liquid water content) at 65 Russian
coastal and island arctic stations, and daily precipitations of 45 stations, for the period 1940-1975. Precipitations could be prepared for all of 65 stations. The preparation of updates could be considered.

6. Preparation of Bias-Free Data Sets

During 1997, the work on developing bias-free data sets continued at NOAA’s National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention is given to improving daily minimum, maximum, and mean temperature and pressure and daily precipitation data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades. Both NOAA/NCDC and RIHMI scientists will continue their work on the basis of these data. Investigation of the changes in extreme climatic events is considered as a main goal of this work in the nearest one-two years.

7. Global Water Cycle

A more detailed version of this part program (the publications, the plans, and the PIs involved) is in Attachment I. The studies of the global water cycle are divided into four parts:

1. Effects of cloud and snow cover on climate;
2. Surface turbulent heat fluxes;
3. Precipitation and snow cover in high latitudes;
4. Evaporation changes in the north extratropical land areas.

8. Soil Temperature Data Project

The creation and exchange of soil temperature data sets both for Russia and the USA was discussed during Roger Barry’s visit to RIHMI-WDC in July 1997. Both sides expressed interest in the exchange of these data, and in research involving these data. The main goal of this project is to organize soil temperature data sets for Russia and North America, to exchange the data for intercomparison and to undertake a joint assessment of soil temperature variations for the 2 countries. Such time series will provide a baseline for global change studies. A list of soil temperature stations (120 stations) in the fUSSR that can be digitized is attached, based on discussions between Dr. Barry and the Soils Institute, RAS, Pushchino. A few stations started around 1900. A CD-ROM containing soil temperature measurements in the Alaskan Arctic was provided to RIHMI at the August 1997 joint meeting.


NOAA’s National Climatic Data Center completed the collection and preparation of 1961-1990 Global Climate Normals for the world Meteorological Organization (WMO) in the Summer of 1996. Data from approximately 130 countries have been collected. Normals data were exchanged between NCDC and RIHMI in 1994. The Global Climate Normals have been sent to the WMO for publication in book form. One CD-ROM with 1961-1990 Global Normal is provided to RIHMI-WDC by NCDC in 1997. Tape copy of normals is provided to RIHMI-WDC in August 1997.

10. Preparation of CD-ROMs

Both sides consider that preparation of CD-ROMs is a good way to provide the various Data to the World’s research community. RIHMI-WDC is able to distribute copies of CD-ROMs among the interested services and institutions within former USSR. The cooperation in this direction continues.

In framework of cooperation between the Arctic and Antarctic Research Institute (AARI), Polar Science Center of the University of Washington, and National Snow and Ice Data Center, University of Colorado, the CD ROM "Arctic Ocean Snow and Meteorological Observations from Drifting Stations 1937, 1950-1991. Version 1.0 1996" has been prepared. It contains archives of synoptic meteorological observations, solar radiation data, and snow cover parameters observed at Soviet North Pole Drifting Stations.

11. Translated Abstracts of Russian-Language Climate Change Publications
The Carbon Dioxide Information Analysis Center (CDIAC) and All-Russian Research Institute for Hydrometeorological Information - World Data Center (RIHMI-WDC) have completed the joint work for preparation, publishing and distribution of the "Selected Abstracts of Russian-Language Climate-Change Publications, Volumes I, II, III, IV. The last volume IV: General Circulation Models" was prepared in 1997.

12. Numeric Data Packages (NDPs)

In cooperation with the All-Russian Research Institute for Hydrometeorological Information (RIHMI) - World Data Center, Obninsk, and NOAA's National Climate Data Center (NCDC), the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) continued to produce additional numeric data packages (NDPs), which are expected to be forwarded to Russian side within 1997. Six CD-ROM's were prepared by CDIAC specially for RIHMI with the first version of 6-and 3-hourly data set for 1966-1995 and used for checking of the data set structure. Both CDIAC and RIHMI agreed that the revised version of this data set should be prepared and issued in the nearest future.

13. Greenhouse-Gas Monitoring Data

The Carbon Dioxide Information Analysis Center (CDIAC), in collaboration with the Main Geophysical Observatory (MGO), in St. Petersburg, archived atmospheric carbon dioxide concentration records derived from flask samples collected at five former USSR stations. CDIAC incorporated the monthly carbon dioxide concentration records into CDIAC's "Trends '93: A Compendium of Data on Global Change" (Brounshtein et al., 1994). The individual flask records received from MGO replaced those previously furnished and documented in a CDIAC numeric data package (Brounshtein et al., 1991).

14. Satellite Data Management

In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) have started to be received and registered at points of Yakutsk and Khabarovsk. The US provided on-land facilities for these goals. Both sides arranged, in parallel, Databases of the HRPT Data registered in Yakutsk. By August 1997, 103 DAT tapes with HRPT data from Yakutsk, were transferred to the US side (for EROS Data Center in South Dakota). The US Side provided DAT tape drive and, partly, DAT tapes for these data exchanges.

15. Development of Telecommunications

Both sides agree that telecommunications become more and more powerful tool for climate data and information exchanges. Both sides believe that access of RIHMI-WDC to INTERNET facilities, which was provided in the middle of 1997, is extremely useful for bilateral cooperation and for advanced Data exchange activity. RIHMI-WDC has got certain opportunities to obtain climate data via FTP and WWW. However, considering the role of RIHMI as of World Data Center, the current capacity of these facilities is not sufficient and should be considered as the beginning one. The further development of these opportunities for RIHMI-WDC as that for the World Data Center, that could increase the FTP access speed and to increase the volumes of data available for bilateral exchanges via telecommunications, is highly significant for both sides.

16. Precipitation Data Rescue Project

A project to rescue precipitation data at RIHMI has been initiated in 1997 and to be continued during 1998-1999. The project will involve: (1) The rescue of aging 9 track magnetic tapes to newer media, (2) The digitization of precipitation data stored on manuscripts, and (3) The exchange of these data between Russia and the USA. It is expected that the first version of the daily precipitation data set (raw data) will be prepared and sent to the US in 1998 and will be examined and checked by both NCDC and RIHMI specialists. For this purpose some short (one-two weeks) visits will be organized if funding permits.

17. Preparation of North Pole Station Data

The current status of this activity, its results and plans for future are listed at Attachment 2
18. Published Materials

AARI has prepared the Publication: "Handbook on CLimate of Russia (Arctic Region). Solar Radiation". The monthly sums of direct, diffused, global and reflected solar radiation and net radiation at 14 russian arctic actinometric stations are presented at this book. AARI began preparing the archives of the daily sums of solar radiation parameters at the same stations.

19. DATA EXCHANGES in 1996-1997

Forwarded to the U.S.:
In late 1996:

- The RIHMI provided their Upper-Air regional and GTS Data bases (Data for 1993 - 1995), to be appended to CARDS Data Base Version 2, during 1996.
- The RIHMI provided to NOAA/NCDC the station history checked, corrected and updated data for the upper air stations.
- The RIHMI shipped to the U.S about 660,000 marine meteorological observations (data from Russian ships)
- DAT tapes containing HRPT Data from reception station in Yakutsk were transferred to U.S. side by August 1997 and are available now to both sides.
- The Data Set of Decadal (ten-days means) Snow Cover Data for 1970-1990 was forwarded to the U.S.
- The updated to 1994 and improved version of daily mean, minimum and maximum temperature and precipitation Data for 223 stations. This Version corresponds to NDP-040 Data Set.
- The Daily Snow Depth Data Set (STOS) for 1985-1990 for 222 Stations
- The Data Set of Decadal (ten-days means) Snow Cover Data for 1970-1990 was forwarded to the U.S.

In 1997:

- The RIHMI provided their Upper-Air regional and GTS Data bases (Data for 1996), to be appended to CARDS Data Base Version 2, in early 1997.
- The RIHMI provided derived from CARDS observational Data Base, - Monthly Aerological Data Set, for the period 1967-1989, to NCDC/NOAA.. The Monthly Data Base for 1946-1966, and for 1990, will be forwarded to NCDC in 1997.
- The Data set on monthly mean river flow for separate stations of Russia, will be forwarded to the U.S. Side in 1997
- The updated to 1994 and improved version of daily mean, minimum and maximum temperature and precipitation Data for 223 stations. This Version corresponds to NDP-040 Data Set.
- The RIHMI provided to NOAA/NCDC the monthly CLIMAT Reports for 243 fUSSR stations for 1995 and 1996.
- Three-hourly data for 15 Russian stations for 1966-1984 for the study of water cycle features.

Forwarded to Russia:

• The U.S. Side provided CARDS-based monthly mean gridded data for the period 1946-1990, to RIHMI-WDCB

• The U.S. provided a combined data set of U.S. upper air station history information and the Russian regional base station history information to the RIHMI.

• The U.S. Side provided 10 CD ROMs with Reanalysis Data for 1987-1996 Period.

• The U.S. Side provided two CD ROMs containing the Northern Hemisphere EASE-Grid Weekly Snow Cover and Sea Ice Extent Data

• One CD ROM containing ARCSS/LAI Data SEries Volume 1: Alaska North Slope Data Sampler


• One CD ROM containing Historical Soviet Daily Snow Depth.


• Climatic Normals for the World Stations Network for the period 1961-1990 (on tape).

• Second Version of GHCN Data Set (mean, min and max temperatures)

• Data set of daily Data for U.S. Stations (1107 Stations from 1948)

• 3-Hourly data for the 15 US stations for the previous 20 years, for the use in framework of the joint Russia-USA work on global water cycle study.

JOINT PUBLICATIONS:


The other publications are listed in Attachment 1.
PLANS FOR 1998
PROJECT 02.08-14: DATA EXCHANGE MANAGEMENT
U.S. Project Leader: Roy Jenne (NCAR)
Russian Project Leader: Marsel Shaimardanov (RIHMI-WDCB)

1. Upper-Air Data Development

1.1 Comprehensive Aerological Reference Data Set (CARDS)

In 1997-98, U.S. and Russian scientists will continue to build the Comprehensive Aerological Reference Data Set (CARDS). Dr. Oleg Alduchov (RIHMI) will continue to enhance the CQC software during 1997-98, in Obninsk, Russia. The new version of CQC (version 3), which will be produced in later 1997, will have several advancements, first of all, will enable temporal check, in addition to the existing check procedures, and will be based on more detailed climatology. The new version of CQC will be implemented at NCDC without delays to produce new versions of CARDS Database Version 3, which will become available as soon as possible to both sides.

Joint efforts will be applied in 1997-98 to Analyze CARDS Database, to prepare Informational Climatic Products on CARDS Database, with emphasize to Station Monthly Statistics Data Set. Work will also continue to develop cloud models for the goals of cloud data control. NCDC and RIHMI-WDCB will consider the issue of CD-ROMs with CARDS-based Data and Information as a significant result of this Joint Activity.

The new version of Station Monthly Statistics Database (MONADS Version 2), will be the output from the CARDS Database version 3. MONADS Version 3 will contain more extended list of statistics.

Selected temperature change climatological analysis based on CARDS Data in comparisons with data on temperature from other sources, will be also provided in 1997-98.

Up to two RIHMI specialists may be invited to NCDC in late 1997-1998, for continuing and review of collaborative work on CARDS, and for outlines of future U/A Data and Climate Joint Activity.

In 1997-98, the Russian side will forward to the U.S.:
1. The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.
2. Informational Climatic Products on Monthly Basis for U/A Stations, as they are obtained from CARDS Version 2 databases (a prototype CD ROM of MONADS products for 1991-1996, may be prepared by Russian Side).
3. Observational upper-air Data for 1997 to be included into CARDS Database
4. Information on Station Histories to be included into new versions of Joint Station History Database.

In 1997-98, the U.S. side will forward to Russia:
1. The CARDS database version 2 through 1997, as data from additional sources are appended and processed jointly with existing data by the advanced version (Version 2) of CQC software.
2. The CARDS Database output from CQC Version 3, for all the period through 1997
3. The CARDS Station History Database versions as they are produced.

Both sides believe that a publication on milestone concepts of CARDS as a Joint Project between NCDC and RIHMI, is desirable. WMO Bulletin is a possible issue for such publication. This publication is reasonable to contain the latest results obtained on CQC implementation and on Analysis and Product Developments.

1.2 Upper-Air Humidity Database Development

Both sides will consider to apply efforts to begin jointly producing Upper-Air Humidity Database for the goals of Atmospheric Water Climatological Change Study. This activity should be considered as a separate one, but the results obtained within CARDS Activity will be of value as a base. By the end of
1997, NCDC and RIHMI will clarify the possible directions of the future work and detect the interested organizations and participants from both sides.

1.3. U/A Climate Time Series Comparisons and Analyses

Both sides have begun their efforts on comparisons of U/A Climate parameters which are obtained from various sources (CARDS data of various spatial and temporal resolution, Satellite Data, Reanalysis Data, etc.). Both sides believe that continued comparisons and joint analysis of climatic time series obtained for the atmosphere from various data types and by various authors, will become a reasonable continuation of joint activity on U/A data.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Alexander Sterin [RIHMI-WDCB])

2. Ship Data (COADS)

The All-Russian Research Institute for Hydrometeorological Information (RIHMI) will provide their possible updates of ship observations, both surface and upper-air, which will be sent to the National Center for Atmospheric Research (NCAR) in Boulder, CO. In return, RIHMI will be provided with COADS Release 1a, 1b and 1c intermediate updates (both observational and monthly data) as they are produced, and with COADS Release 2 when completed.

There are approximately 10,000,000 observations from 1945 through 1990 contained in RIHMI-WDC archives in paper form, from the USSR research ships. These observations are contained in books in typewritten form. It may be advantages for the research community, to make available instrumental observations from research vessel cruises over the World Oceans, including Arctic and Antarctic regions. General survey information on location of observations, distribution of observations over the period by year, etc., will be prepared by the Russian Side and submitted to the U.S. Side. This will be helpful to come to conclusions what may be the first priority to prepare these data on computer media, for research. Such information may be used to initiate the cooperative prototype Project to begin the rescue of these Data.

(U.S. PI: Steve Worley [NCAR], Scott Woodruff [NOAA/Office of Atmospheric Research], Joe Elms [NOAA/NCDC], and Russian PI: Marsel Shaimardanov [RIHMI-WDCB])

3. River Data

In 1996-97, Russian Side had worked with the data set of mean monthly and mean annual river flow data from the US Side - USGS (for a total of 454 rivers), that were prepared through 1995-96 and transferred to Russian Side in August 1996, and had got certain experience in working with these data. Russian Side, in response, is preparing the data set of mean monthly river flow data for several parts of territory of Russian Federation. This data set covers the period from the beginning of observations till 1985. It should be transferred to the U.S. Side in 1997. Also, Russian Side prepared an inventory of existing river data bases, including the information on their status, periods, time resolution, check efforts, media, etc. This information will be used in 1997-98 for future planning of River Data Activity and for it's extension in future.

After the data on monthly mean flow within this equivalent exchange will be analyzed, there is a reason to concentrate on River Daily Data exchanges for a limited list of observational stations (of about 20 stations for each side). Both sides will consider their best solutions on support to provide this activity. Both sides agree that a meeting between specialists of both countries to discuss snowpack measurement procedures, as well as streamflow measurements, archiving and forecasting procedures, could be arranged in approximately 15 to 18 months, in Russia. Specialists from various agencies involved in these problems, could be participating this meeting. The possibilities on arrangement this meeting will be considered by both sides.

(U.S. PI: Roy Jenne [UCAR], Jim Slack [USGS] and Russian PI: Marsel Shaimardanov [RIHMI-WDCB])

4. Snow Data
The bilateral cooperation and data exchange between Russia and the U.S. was developed in 1996 by surface snow data study and exchange. This activity will continue in the future. CIRES and WDC-A for Ice and Snow from the U.S. side and RIHMI-WDCB and Institute of Geography from Russian side are planning a joint work for investigation of snow cover change over the both countries in the last two decades. Snow cover data sets are prepared in both countries and available now for exchange and investigation. Both sides will study the data sets of ten-days mean values of snow cover, which were exchanged in 1996. Gaps in data will be identified and filled in when possible. The exchange of ten-days means data on snow cover will continue in 1997-1998.

Special attention will be paid for updating for 1991-1994 and improving of the baseline daily snow depth data set for 223 of the USSR stations (data set STOS). This data set is an important part of any work for comparison of snow cover change over two countries for long period.

Both sides will consider the possibility of preparation special data set of daily precipitations at 20 Russian Arctic Stations for period 1940-1975, that could become the addition to existing datasets.

US PI: Roger Barry (CIRES/WDC-A for Ice and Snow) and Russian PI: Vyacheslav Razuevaev (RIHMI-WDCB) and Alexander Krenke (Institute of Geography of Russian Academy of Science).

5. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Future exchange activities will include updating those data sets previously exchanged with more current data. During 1997-98, several activities will take place: (1) the historical monthly mean data sets for humidity, pressure, and sunshine duration for 243 stations will be prepared at RIHMI to include data through 1994; (2) three-hourly and daily meteorological data sets for Russian stations from 223 stations of the former USSR will be updated from 1990 through 1994; (3) snow data sets (data set STOS) will be updated to 1994; (4) CLIMAT message data for 243 stations collected from GTS for 1996 and 1997 will be prepared by RIHMI during 1997-1999.

The NCDC will update and send to RIHMI: (1) an update to 1996 version of the Global Historical Climate Network data set (version 2); (2) daily data on an increased number of meteorological parameters for 120 stations for 1995; (3) three-hourly synoptic observations for the Worldnet stations for the period 1988-1996; (4) GHCN Maximum and Minimum Temperature for 1800-1996.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuevaev [RIHMI-WDCB])

6. Preparation of Bias-Free Data Sets

During 1997-98, the work on developing bias-free data sets will continue at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention will be given to improving daily minimum, maximum, mean temperature and daily precipitation data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades and for the investigation of the changes in climatic extreme events. Both NOAA/NCDC and RIHMI scientists will continue work on the basis of these data sets.

(U.S. PI: Thomas Karl [NOAA/NCDC] and Russian PI: Vyacheslav Razuevaev [RIHMI-WDCB])

7. Global Water Cycle

Please see Attachment 1 for information about the plans for this project.

8. Preparation of CD-ROMs

NOAA's National Climatic Data Center (NCDC), in conjunction with the Carbon Dioxide Information Analysis Center (CDIAC) in Oak Ridge, Tennessee, is producing a CD-ROM of the regional three-and six-
hourly synoptic observations for the period 1936-86. CDIAC in cooperation with RIHMI is preparing the data for the disk, and will issue a CD-ROM of the data in 1997. NCDC in cooperation with RIHMI will also utilize these data and available regional daily data in preparing climate summaries for the set of regional sites. These summaries will be included on the Version 4 of the International Station Meteorological Climate Summary (ISMCS) CD-ROM, that became available now.

Both sides believe that CD-ROMs (2 copies) produced by the U.S. Side, should be forwarded to RIHMI-WDCB, for further processing and/or dissemination among the interested organizations within Russia. Both sides believe that preparation of data files and software files in final form (to be put on the CD-ROM Media) could begin now also in Russian centers. The sides agree that it would be desirable for the Russian side to obtain the information on technology and processing necessary to prepare pre-master copies of CD-ROMs in Russia (with data and software). The issue of copies of such CD-ROMs could be provided by joint efforts on both sides. This activity could be discussed more in 1998.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Marsel Shaimardanov, Vyacheslav Razuvaev [RIHMI-WDCB])


Both sides will consider the possible ways to continue activity on translated abstracts and its possible outputs, if funding will be available. The continued cooperation between both sides with active participation of ORNL/CDIAC, is highly desirable.

(U.S. PI: Robert Cushman [ORNL/CDIAC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

10. Numeric Data Packages (NDPs)

In cooperation with the Russian Research Institute of Hydrometeorological Information (RIHMI) - World Data Center, Obninsk, and NOAA's National Climatic Data Center (NCDC), the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) produced additional numeric data packages (NDPs) based on expanded versions of the 223- station Russian climate data sets. The NDP-048 (6- and 3- hourly meteorological observations for 223 stations) will be updated with newly available data.

Both sides believe that issues of TRENDS Volumes, such as TRENDS 91, TRENDS 93, are a good way to provide climatic data and information to research community, and future continuation of this activity with participation of Russian specialists, is reasonable. The continued cooperation between both sides with active participation of ORNL/CDIAC, is highly desirable.

(U.S. PI: Robert Cushman, Thomas Boden [ORNL], Peter Steurer [NOAA/NCDC] and Russian PI: Marsel Shaimardanov, Vyacheslav Razuvaev [RIHMI-WDCB])

11. Greenhouse-Gas Monitoring Data

In cooperation with the Main Geophysical Observatory, St. Petersburg, and the Institute of Global Climate and Ecology (IGCE), Moscow, the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) proposes to receive additional greenhouse-gas monitoring data from Russian stations for eventual publication as CDIAC numeric data packages and in CDIAC's "Trends '95: A Compendium of Data on Global Change." CDIAC proposes, as part of this project, reciprocal visits between Oak Ridge, Moscow, and St. Petersburg as budgets permit.

(U.S. PI: Thomas Boden [ORNL] and Russian PI: Alexander Shashkov [MGO], Felix Rovinsky, Vladimir Egorov [IGCE])

12. The Climate Study based on CLIMAT and CLIMAT TEMP Message Database

NCDC of US and RIHMI-WDC are beginning joint research in improvement of databases which are obtained from CLIMAT messages. This activity has begun in 1997. Representatives of Climate Prediction Center (Washington, USA) will take part in this work too.
In 1997-98, the new activity based on improvement of database of CLIMAT TEMP messages, will begin jointly by NOAA/NCDC and RIHMI-WDCB.

(U.S. PI: Gus Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev, Alexander Sterin [RIHMI-WDCB]).

13. Satellite Data Management

In 1997-98, activity will continue on satellite data exchange. In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) received and registered at point of Yakutsk (Russia), will continue to be exchanged. The U.S. Side will consider the possibilities to partly support these activities. Both Sides are interested to arrange the Database of these Data and to make it available for both sides. In 1997-98, the availability of HRPT Data from Yakutsk station to both sides will continue to be provided.

(U.S. PI: Roy Jenne (NCAR), and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

14. Soil Temperature Data Project

The main goal of this project is to organize soil temperature data sets for Russia and North America, to exchange the data for intercomparison and to undertake a joint assessment of soil temperature variations for the 2 countries. Such time series will provide a baseline for global change studies. Tasks to be provided in 1997/1998 are to prepare a list of stations and variables, and preliminary data assembly and exchange of samples of data.

PIs from Russia:
D. Gilichinsky, Soils Institute, RAS, Pushchino
N. Romanovskii, Geocryology Dept., Moscow State University
A.N. Krenke, Inst. Of Geography, RAS, Moscow,
V. Razuvaev, RIHMI-WDCB, and

PIs from USA: R.G. Barry, NSIDC, University of Colorado,
F. Nelson, Geography Dept., SUNY, Albany, NY

15. Creation of 1961 Global Normals

NCDC will place the Global Climate Normals on CD-ROM and exchange these data with RIHMI in 1997.

(PI from U.S: August Shumbera, [NCDC/NOAA], and PI from Russia: Vyacheslav Razuvaev (RIHMI-WDCB)).

16. Precipitation Data Rescue

A project to rescue precipitation data at RIHMI has been initiated in 1997 and to be continued during 1998-1999. The project will involve: (1) The rescue of aging 9 track magnetic tapes to newer media, (2) The digitization of precipitation data stored on manuscripts, and (3) The exchange of these data between Russia and the USA. It is expected that the first version of the daily precipitation data set (raw data) will be prepared and sent to the US in 1998 and will be examined and checked by both NCDC and RIHMI specialists. For this purpose some short (one-two weeks) visits will be organized if funding permits.

(PI from U.S.: August Shumbera (NCDC/NOAA) and PI from Russia Marsel Shaimardanov (RIHMI-WDCB)).

17. Surface Radiation Data and Turbidity

The networks of station radiation data were discussed. Data for radiation and turbidity are important for global change studies. In cooperation with NSIDC AARI will consider preparation of Archive, containing
daily sums of solar radiation at 8 coastal and island Russian stations. This job could be performed during 1998-1999. Data on additional 6 stations are already issued and are contained in the Archive of World Radiation Data Center (MGO). It is planned to also discuss these data at the next meeting of data coordinators.

(PI from U.S.: Roy Jenne (NCAR), PI from Russia: Marsel Shaimardanov (RIHMI-WDCB)).

18. Development of Telecommunications

Both sides believe that access of RIHMI-WDC to Internet facilities, which was provided in the middle of 1997, is extremely useful for bilateral cooperation and for advanced data exchange activity. RIHMI-WDC has got certain opportunities to obtain climate data via FTP and WWW. However, considering the role of RIHMI as of World Data Center, the current capacity of these facilities is not sufficient and should be considered as the beginning one. The further development of these opportunities for RIHMI-WDC as that for the World Data Center, that could increase the FTP access speed and to increase the volumes of data available for bilateral exchanges via telecommunications, is highly significant for both sides.

Both sides will consider possible increase of telecommunications capacities of RIHMI-WDC as of World Data Center. To provide wider access to existing Internet resources in Global Changes, Global Changes Data, to Climate Data, Information and Climate Products, both sides plan to exchange their lists of known, non-depending on country, Web Sites, which contain such information. Further actions on this will be considered after this first step in sharing the experience in telecommunications.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

19. Compilations of Databases for Climate Study and Observational Stations Information Activity.

Both sides have discussed the possibilities of the creation of compiled databases for various components of the Climactic System. The sides will continue the consultations and will discuss at the next meeting. One of the issues that requires additional activity is to compile and to revise existing information on Observational Stations, the changes in Observational Network and the changes in instrumentations. The activity on this issue will continue in 1997-98.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDC))

20. Mountain Snow and Ice Activity.

Both sides reviewed existing data sets on mountain snow and ice. The methodologies of mountain snow and ice measurements, used by each of sides, were also reviewed and discussed. The US Data set is currently in digital format, while the Russian data set has not yet been digitized. The US Side agrees that monthly snow course data will be published on CD ROM in approximately one year. Daily snow Data, collected through the SNOTEL network, will be made available to the Russian Side on the CD ROM after approximately, 2 years. Mike Gillespie reported on the US SNOTEL archives and plans.

Both sides agree to consider the possible ways to provide the digitizing the data of Russian side on Snow and Ice in mountains.

Both sides agree that a meeting between specialists of both countries to discuss snowpack measurement procedures, as well as streamflow forecasting procedures, could be arranged in approximately 12 to 18 months, in Russia. Specialists from various agencies involved in these problems, could be participating this meeting.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDC))

21. Agricultural Meteorology Issue

Prof. Oleg Siriotenko of Russian Research Institute of Agricultural Meteorology, Obrinsk, informed both sides on his models of crops, which are supported by several climatic data bases. The contents of these data bases was also discussed. These materials are of interest to both sides.
One of the possible ways of cooperation in this direction is the future issue of CD ROM containing several new climatic scenarios, by US side. The Russian side will use these scenarios in their studies. The transitive scenarios are of essential interest to the Russian side for this study.

22. Fresh Water Ice Data

A discussion on the exchange of data on dates of freeze-up/break-up of lakes and rivers in Russia and the U.S. has taken place between GGI, St. Petersburg and WDC-A for Glaciology. While the records are not numerous and the data volume is small, both sides have expressed interest in the exchange and analysis of such records. A list shows 49 river stations that can be digitized. The period of record is usually 40 or 50 years.

(PI from Russian Side: Dr. V. Vuglinsky, GGI, St. Petersburg, PI's from U.S. Side: R. G. Barry, WDC-A for Glaciology, J. Magnusson - Center for Limnology, Univ. of Wisconsin)

23. Preparation of North Pole Station Data

Please see information on this issue in Attachment 2

24. Data Coordinator’s Meeting

The next meeting of the data coordinators will be held at USA on July-October 1998. Up to three (3) specialists from Russia will be invited for up to seven (7) days.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])

25. Additional Exchange of Scientists

Specialists from Russia have presented papers to 22 Annual Climate Diagnostics and Prediction Workshop in Berkeley, CA, USA, in October 1997. The papers are accepted by Workshop Committee and are included in Poster Sessions. Search of any available possibilities in participating such Meetings is recommended, as they are very significant for specialists from both sides.

Up to three specialists from Russia could participate the 23 Annual Climate Diagnostics and Prediction Workshop in U.S. in late 1998.

Up to two RIIHM specialists may be invited to NCDC in late 1997-1998, for continuing and review of collaborative work on CARDS.

Pending the availability of funds, additional reciprocal visits of Russian and U.S. specialists will be considered for participation in international and bilateral meetings in support of the activities conducted within the framework of Project 14.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])

26. Future Activities on Climatic Data Exchange Management.

Both sides believe that Climatic Data Exchange Management upon the Project 14 of Working Group 8 is developing sustainably and is a good sample of mutually effective joint cooperation between both countries. Considering possibility of transformations in future, both sides believe, that there exists a strong need to continue bilateral activity on Climatic Data Exchange Management and to provide this activity within an autonomous project, not depending on transformations which may occur on high levels. The transfer of this activity as of a separate project or sub-project, under U.S. - Russia Gore-Chernomyrdin Commission, can be considered as one of the possible ways of continuation this activity.
SUMMARY OF PLANNED 1997-98 DATA EXCHANGES

From the U.S. to Russia:

- The CARDS database Version 2 Data for period through 1997, as data from additional sources are appended and processed jointly with existing data by the Version 2 CQC Software, will be forwarded to RIHMI.

- The later version of CARDS Database Data (CQC Version 3 Outputs through 1997) as soon as they will be completed, will be forwarded to RIHMI.

- The CARDS Derived Database of gridded monthly means for the period 1991-1997, after updating by Data from additional sources and CQC Version 2 processing, will be forwarded to RIHMI.

- The CARDS Station History Database versions, as they are produced, will be forwarded to RIHMI.

- The NCDC will update and send to RIHMI on a regular basis the annual additions to the Global Historical Climate Network data set (Version 2).

- The U.S. side will send to RIHMI the updates to COADS Release 1a, b and c observational and statistics Data.

- As soon as COADS Release 2 will be prepared, it will be forwarded to Russian side.

- NOAA/NCDC will send to RIHMI six-hourly and three-hourly synoptic observations data set for the Worldnet stations for the period 1988-1995.

- NCDC will send to RIHMI the snow cover data set of ten-days mean values

- The U.S. Side will forward the CD-ROMs with NCAR/NCEP Reanalysis Project Data Sets, as they will be issued, to Russian side.

- WMO Climate Normals for 1961-1990 on CD ROM will be forwarded to Russian side.

- The daily river flow data for a separate list of stations (about 20 stations) over the U.S. territory, will be directed to the Russian Side in 1998.

From Russia to the U.S.:

- The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.

- Upper-Air Informational Climatic Products, as they are obtained from CARDS Databases

- Observational upper-air Data for 1997 to be included into CARDS Database

- Information on Station Histories of Upper-Air Observations to be included into new versions of Joint Station History Database

- The RIHMI will send to NCDC the historical monthly mean data sets for humidity, pressure, and sunshine duration for selected 243 stations up to 1994.

- Three-hourly and daily meteorological data sets for 223 stations will be updated from 1990 through 1994 for Russian stations and others, if possible, and sent to NCDC.

- Snow data sets (Data set STOS) will be updated to 1994 and sent to NCDC (for SNIDC).

- RIHMI will prepare monthly mean river flow data for extended list of stations and will forward them to the U.S.

- The daily river flow data for a separate list of stations (about 20 stations) over the Russian territory, will be directed to the U.S. Side in 1998.

- RIHMI will prepare updates to marine surface meteorological and marine upper-air data and will send them to the U.S. side.

- Russian Side will forward to the U.S. Side the HRPT Data from NOAA Polar Orbital Meteorological Satellites as they are registered by reception stations located in Yakutsk.

- Three-hourly data for 15 Russian stations for 1966-1984 for the study of water cycle features.

- Precipitation Data from Russian Stations, in the Framework of Precipitation Data Rescue Project

Roy L. JENNE,
NCAR
Project 02.08-14
Leader from U.S. Side

Marsel SHAIMARDANOV,
RIHMI-WDC
Project 02.08-14
Leader from Russian Side
Hydrological Cycle Studies, a Report of Activities (1996-1997) and Plans for Future

A brief report on activities during the period August 1996 to August 1997 in the framework of the Hydrological Cycle Studies item 14.7 of the 1997 Protocol on collaboration between the United States and Russia on in the field of the Protection of the Environment and Natural Resources (Working Group VIII: The Influence of Environmental Changes on Climate), and plans for more work. The report is supplemented by the list of refereed publications and presentations at international conferences (usually accompanied by a abstract and/or conference paper) that have been published, presented and/or submitted during the past twelve months. These references are also embedded into the text of the report where it is appropriate.

The studies were carried out in four major research areas.

1. Effects of cloud and snow cover on climate.

Empirical studies of cloud and snow cover effects on climate based on a blend of observational meteorological data for the past several decades were continued and expanded to the tropical zone. This approach employs the idea that the analysis of climate variability observed during the period of intensive instrumental observations can provide "overall estimates" of these effects. An archive of synoptic observations of more than 1500 stations over the Northern Hemispheric land areas has been compiled and updated (for the United States up to 1996 and for the former Soviet Union up to 1990/93). Climatologies of clear and overcast skies for Northern Hemisphere were constructed in the form of deviations from the average climate conditions. The performance of six global climate models (i.e., their ability to describe the relationships between climate variables in the simulations of the modern climate) has been tested using this approach. These results have been presented in the following related papers:


Groisman, P. Ya.;: "Recent snowfall and snow cover variations in northern high latitudes: Present status of research and relevance to the climate change problem" Encyclopedia of Hydrology and Water Resources, invited article (in press).


Groisman, P.Ya., Bradley,R.S., Sun, B.-M. and Sporyshev, P. with the assistance of the AMIP members from the Canadian Climate Centre; University of Illinois at Urbana-Champaign, USA; U.S. National Meteorological Center; Main Geophysical Observatory, Russia; Max Planck Institute, Germany; and Goddard Institute for Space Studies, USA, 1997; "Internal consistency of cloud and snow cover parameterizations in the GCMs: Comparison with empirical data" (in preparation).


2. Surface turbulent heat fluxes.
The turbulent heat fluxes at the soil surface are not observed (or poorly observed) by existing observational systems. This affects our ability to reliably predict the consequences of climate changes on the hydrological cycle. Therefore, an approach to estimating sensible surface heat fluxes based on the theory of similarity, and using routine meteorological observations available in Russia, China, Mongolia, Romania, and several other countries was developed (Groisman and Genikhovich 1997). A similar approach to estimating latent heat fluxes is developed, but only for saturated surfaces (wet and/or snow-covered). The method has been tested on numerous observational data sets from Russia, China, The Netherlands, and the United States and then applied to the territory of the former USSR, using the 3-/6-hourly data of 257 stations for the past several decades to assess the sensitivity of sensible heat flux to cloud and snow cover and to construct the time series of these fluxes for the period from 1950 up to date (currently up to year 1990). The estimates of "overall climate effect" on seasonal sensible heat fluxes are compared with similar estimates from six general circulation models (GCMs) to assess the abilities of these GCMs to reproduce the "response" of this flux to cloud cover change. During this project a valuable data set of several boundary layer field experiments carried out by Russian Hydrometeorological Service during the post WWII period have been digitized and prepared for dissemination to the scientific community.

Related papers are:


Groisman, P.Ya., Bradley, R.S., Sun, B.-M. and Sporyshev, P. with the assistance of the AMIP members from the Canadian Climate Centre; University of Illinois at Urbana-Champaign, USA; U.S. National Meteorological Center; Main Geophysical Observatory, Russia; Max Planck Institute, Germany; and Goddard Institute for Space Studies, USA, 1997; "Internal consistency of cloud and snow cover parameterizations in the GCMs: Comparison with empirical data" (in preparation).


3. Precipitation and snow cover changes in high latitudes.
Studies of precipitation changes and accuracy of precipitation measurements in high latitudes were continued. An algorithm of the most accurate adjustments of the U.S. precipitation data was tested and applied to the U.S. gridded hourly precipitation data set. A new approach to assess the changes in extreme precipitation in the future climate changes was suggested and is currently intensively tested on the daily precipitation data sets of eight countries. The results of these studies have been presented in several review papers, reports and conference presentations:


4. Evaporation changes in the north extratropical land areas.

These studies have been continued with the focus on the evaporation from snow cover. An unique archive of evaporation measurements from snow cover conducted in Russia in the 1960s and 1970s has been digitized at the NCDC and made available for scientific community. These data were used for further evaluation of the algorithm of latent heat flux estimation from snow cover (Groisman and Genikhovich 1997) and for the analysis of trends in evaporation from snow cover over North Eurasia (Groisman et al. 1997).

Relevant papers are:


In year 1997 we planned data exchange that included two items:

1. For the joint studies of variability of hydrological cycle over both countries we planned an exchange of the time series of synoptic observations from 15 stations in the U.S. and Russia. This exchange will be completed in August 1997 during the Meeting of National coordinators in Obninsk, Russia.

2. In the framework of joint analyses of the structure of changes in daily precipitation over the United States and Russia, we planned an exchange of the time series of daily precipitation from approximately 1000 stations from each side. A time frame for the transfer of Russian precipitation data was not fixed due to a large volume of preparatory work required. The U.S. side has prepared a daily precipitation data set from a selected (best) 1060 stations for the contiguous U.S. The data transfer will be conducted in August 1997 during the Meeting of National coordinators in Obninsk, Russia.

General list of references used in this report:


Groisman, P.Ya., Bradley,R.S., Sun, B.-M. and Sporyshev, P. with the assistance of the AMIP members from the Canadian Climate Centre; University of Illinois at Urbana-Champaign, USA; U.S. National Meteorological Center; Main Geophysical Observatory, Russia; Max Planck Institute, Germany; and Goddard Institute for Space Studies, USA, 1997; "Internal consistency of cloud and snow cover parameterizations in the GCMs: Comparison with empirical data" (in preparation).


Plan for a future studies in year 1998 and beyond

14.7 Global Water Cycle

We plan to advance in our understanding of the hydrological cycle by working in all four directions outlined in the above report. Specifically our WG-8 plan has the title: "Joint study of the variation of hydrological cycle over the U.S. and Russia" and has the following two specific tasks in 1998: (1) assessment of evaporation estimates based on standard meteorological observations delivered by the U.S. and Russian synoptic stations; and (2) analyses of the structure of changes in daily precipitation over the United States and Russia with an emphasis on extreme precipitation events.
Task (1) will be implemented by an exchange of the time series of synoptic observations from another 25 stations in the U.S. and Russia. These stations will be well distributed over the major climatic zones of both countries and located mostly in rural environments. The data will be used in joint studies of the variability of the hydrological cycle over both countries. The algorithms tested/developed will be applied on a larger scale to primary meteorological networks in the U.S. and Russia.

(U.S. PIs: Tom Karl, Tom Peterson, and Pavel Groisman [NOAA/NCDC] and Russian PIs: Valentin Golubev [SHI], Eugene Genikhovich [MGO], and Vyacheslav Razuvaev [RIHMI])

Task (2) will involve an exchange of the time series of daily precipitation from approximately 1,000 stations from each side. The U.S. side has already completed most of its data preparation and data transfer but will continue to update the data provided in year 1997 and expand them into the past to cover the first half of the XX century. It is understood that significant efforts will be required from the Russian side prior to the exchange of this data. These efforts include retrieval and quality control of the national archive of daily precipitation. Therefore, a time frame for the transfer of Russian precipitation data will not be fixed at this stage.

(U.S. PI: Roger Barry [National Snow and Ice Data Center/University of Colorado], Henry Diaz [NOAA/CDC], Gus Shumbera and Pavel Groisman [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI] and Valentin Golubev [SHI]).
North Pole Ice Island Raobs

The Russian government took surface and upper air observations from a series of ice island stations for about 1954-1990. It was a great achievement by the observers to gather these important observations. Much of the surface data has already been prepared on a CD-ROM. The upper air (UA) data is also very important for use in research. The progress of the work to prepare the UA data is approximately as follows:


About 1990, a dataset of only the lower levels of rawinsondes, and only one time per day (00 GMT) became available.


An interim dataset became available about March 1997. We recognize the achievements of people on both sides, who worked for about six years to prepare this data. The data includes rawinsondes for two times each day. The data still has some serious problems with the date/time of soundings and in the merging of the upper and lower parts of rawinsonde soundings.

c. Version 3.

This is a more complete dataset of North Pole raobs prepared by Russian colleagues. Data not previously included has been added to version 2 and an intensive quality control was performed. Some date/time control problems may still remain. Specialists from both sides discussed and agreed to a plan to review a sample of the data set where previous problems in version 2 were identified to determine what problems may still remain in the data set. An effort will be made by the Russian side to fix remaining problems before the data are exchanged.

Plan:

The Russian side suggested that the data (version 3) should be made available to RIHMI and NCDC. The U.S. side will consider inviting two or three Russian specialists to deliver and discuss the data set when it is ready to deliver to the NCDC. (P.I.s U.S. - August L. Shumbera, Jr. (NCDC); Russia - Dr. Nina Zaitseva (CAO), Dr. Andrey Nagurny (AARI)
US-Russia Data Exchange  
(Meeting of data coordinators, Aug 5-9, 1996)

(Small changes from version dated July 24)

Russian Visitors:  
Drs. Marsel Shaimardanov and Alex Sterin.  
Marsel Shaimardanov is Director of RIHMI (All-Russian Research Institute for  
Hydrometeorological Information) that is two hours west of Moscow.  Alex Sterin is  
a senior staff member in RIHMI.  World Data Center B is located at RIHMI.

August 3, Saturday
• Delta Flight #1251 From Moscow (#31 thru NY Kennedy) to Denver  
  International Airport arrives at 4:00 pm  
• Jenne will meet the flight  
• Hotel accommodations at Best Western-Golden Buff Lodge in Boulder (442-7450)  
• Phone Numbers:  
  work:  
  home:  
  Roy Jenne    497-1215    499-1676  
  Dennis Joseph 497-1216    530-1045  
  Debby Novak  497-1231    970-593-9397

AGENDA:

Aug 5, Monday:  
Pickup at hotel, 08:45 am by Dennis Joseph  
Meeting starts at 09:15 am, Director's Conference Room, NCAR Mesa Lab

0915 Welcome---by Bill Buzbee, Director Scientific Computing Division  
Overview of NCAR--by Director of NCAR (or other)  
0935 Discuss the agenda and plans for the meeting  
Plans for the preparation of the document  
0945 Data that have been exchanged--Pete Steurer, NCDC  
—Discussion

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*Plans for the update of various datasets  
— Updates by NCDC, by Pete Steurer  
— Updates prepared by Russia  
— Discussion

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Other NCDC plans for the data exchange
Exchange of surface marine data
- Status of COADS project
- Ship data from Russia
- Presentation by Steve Worley, NCAR
- Plans for the exchange
- Discussion

1215 Lunch in NCAR Cafeteria

1:30 pm Resume Meeting
Exchange of Monthly River data
- US River data, update of more years
- Adding more US rivers
- Presentation by Jim Slack, USGS
- Initial look at Russian data by US
- Status of river project in Russia
- Comments by Dennis Joseph, NCAR
- Discussion

~2:30 pm Tour of computer room
coffee break (~45 min)

~3:15 pm Rawinsonde data for reanalysis (and UA winds)
- Overall presentation by Roy Jenne
- Inventories for Antarctic stations, permanent ships, some isolated stations
- Russian ship data and North Pole data
- Problems in preparing world library data
- Includes comments by Bob Dattore, Dennis Joseph, Will Spangler, Gregg Walters and Joey Comeaux
- Discussion

**Aug 6, Tuesday:**
Pickup at hotel, 08:45 am by Dennis Joseph
Meeting starts at 09:15 am, Director's Conference Room, NCAR Mesa Lab

0915 The data exchange document
- More information about updates?
- Other comments on the document

0930 Overview of snow observations in US
- The COOP stations
- Inventory of US COOP stations that report precip, temperature, snow
- US mountain snow: Snotel observations by Mike Gillespie, Snow Survey section of NRCS
- Aircraft measurements
~1000  Snow data and soils data exchange
    — Presentation and discussion led by Roger Barry, SNIDC
    — A few notes prepared by Roy Jenne
    — More discussion of data exchange
        — exchange visits

1215   Lunch in NCAR cafeteria

130 pm  Surface radiation measurements in US
    — hourly and daily data

~230   Discussion of data exchange
    — Exchange visits
    — Next meeting of coordinators
    — Etc.

630 pm  Outdoor dinner at Dennis Joseph’s residence
    (pickup at hotel at 6:15)

Aug 7, Wednesday:
    Pickup at hotel, 08:30 am by Roy Jenne
    Drive to Ft. Collins

1000-1130 am  Visit Colorado Climate Center, at Colorado State University
    — Visit with Tom McKee and Nolan Doesken
        • Data in Colorado
        • What does this state center do?
        • Help for national observations
        • Help for Universities, schools, state operations, etc.

230 pm   arrive back at NCAR

230 pm   The NCEP/NCAR Reanalysis Project
    — Description of the project, by Jenne
    — Preparation of datasets for reanalysis
    — CD-ROMs that will be available

Aug 8, Thursday:
    Pickup at hotel 0845 am.

0915   Meeting starts
    — More discussions of documents, if necessary

--- An overview of data at NCAR
    — The data
    — How users access the data
Selected long datasets in the US
— SST, sea ice, total ozone, etc.

130 pm Drive to mountains, hike to lake

**Aug 9, Friday:**
Pickup at hotel 0845 am.

0915 More tour of NCAR
— Sign documents
— Afternoon free for shopping, etc.

**Aug 10, Saturday (departure):**
- *Delta Flight 1716-from Denver International to NY-Kennedy leaves at 10:45 am.*
- *Pickup at hotel at 8:00 am, by Roy Jenne*
Report of the
Data Exchange Coordinators Meeting
(Boulder, Colorado, USA, 4-10 August 1996)

This meeting was held under the bilateral program:
U.S. - Russia Agreement on Cooperation in the Field of Protection of the
Environment and Natural Resources

Working Group VIII:
The Influence of Environmental Changes on Climate

PROJECT 02.08-14: Data Exchange Management

DATA EXCHANGE COORDINATORS MEETING
(Boulder, Colorado, USA, 4-10 August 1996)

IMPLEMENTATION REPORT AND PLANS FOR 1997

Participants in the Meeting:

a. Russian Side
   Marsel Shaimardanov, Director RIHMI-WDCB
   Alexander Sterin, RIHMI-WDCB

b. US Side
   Roy Jenne, NCAR
   Peter Steurer, NCDC, Asheville
   Roger Barry, SNIDC (Snow and Ice)
   Jim Slack, USGS (River data), Reston, VA
   Mike Gillespie, NRCS
      (Snow Survey, Dept. of Agriculture)
   Nolan Doesken, Colorado State University,
      Deputy State Climatologist
   Dennis Joseph, NCAR
   Steve Worley, NCAR
   Will Spangler, NCAR
   Bob Dattore, NCAR
   Joey Comeaux, NCAR
   Debby Novak, NCAR

Note: Annex 3 has lists of data
REPORT ON IMPLEMENTATION

EXCHANGE OF SCIENTISTS:

During 3-10 August 1996, Drs. Marsel Shaimardanov and Alexander Sterin (RIHMI-WDC) visited NCAR (Boulder, CO) to discuss the results of bilateral Data Exchanges in 1996 and plans for future exchanges in 1997. Within their visit, the following problems were discussed: Proposal on Development of Telecommunications in RIHMI-WDC, the Development of Cooperative Comprehensive Data Set. In November 1995, Dr. Alexander Sterin participated in CARDS peer review panel meeting at NCDC. NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) exchanged upper air data and collaborated on the joint development of the Comprehensive Aerological Reference Data Set (CARDS). Dr. Oleg Alduchov was invited to NCDC in August 1996 for a period of up to 45 days to take part in improvement of U/A Data Complex Quality Control (CQC), in analysis of CQC errors and to participate in obtaining CARDS Version 2 Data Base that will become available to both sides. Up to two RIHMI specialists may be invited to NCDC in late 1996-1997 for periodic review of collaborative work on CARDS. During 1996, Dr. Pavel Groisman (State Hydrological Institute) continued his affiliation at University of Massachusetts. In September 1996, Dr. Groisman will become a visiting scientist for one year under the UCAR Visiting Scientist Program.

Up to three specialists from Russia may participate at 21st Annual Climate Diagnostics and Prediction Workshop in Huntsville, Alabama, in October 1996. This meeting will be used for discussing the status of preparation of baseline data sets for climate research.

Dr. Roger Barry NSIDC may visit WDC-B1 during the late winter/spring of 1997. This would enable discussions of ongoing snow cover, soil temperature and the proposed precipitation time series projects.

JOINT COLLABORATION:

1. Upper-Air Data Cooperation (CARDS Project)

In 1995-1996 US and Russian Scientists continued to build the Comprehensive Aerological Reference Data Set (CARDS). In continuation to his NRC Fellowship, Dr. Oleg Alduchov in late 1995 1996 continued to work at RIHMI-WDC over Version 2.0 of Comprehensive Quality Control (CQC) for CARDS Upper-Air Data Software. This Version is based on advanced climate statistics, which were prepared on CARDS Data for 1986-1990. This version also contains graphical components to improve the interface to Data. Dr. Oleg Alduchov was invited to attend NCDC in August 1996, for a period of up to 45 days, to take part in improvement of U/A Data Complex Quality Control (CQC), in analysis of CQC errors and to participate in
obtaining CARDS Version 2 Data Base. This Version of CARDS Data Base will become available to both sides. NCDC will re-run CQC of CARDS Database and will deliver the new version of CARDS Database to RIHMI. Earlier, at the end of 1995, the US Side has forwarded the full CARDS Database Version 1, to RIHMI-WDC. Russian side provided to US Side the Upper-Air Data for 1991-1992, to be appended to new version of CARDS Database in 1997. Russian Side in 1996 provided to US Side the Upper-Air Data for 1993-94, to be appended to new version of CARDS, in 1997.

The job for the goals of temperature correction model on determination of bases, tops and cloud amounts for low, medium, and high clouds from radiosonde soundings is also performed in the framework of this activity. The jobs on CARDS Database Analysis and preparing Upper-Air Climate Informational Products, as well as jobs on CQC and cloud data adjustment, were continuing in late 1995-1996. The Draft formats of U/A Station Monthly Statistics Database were prepared jointly by RIHMI and NCDC specialists. Both sides applied their efforts to produce, check, correct and to update the combined Upper-Air Station History Database. The U.S. Side forwarded the corrected version of station history Database to Russian side, in early 1996. Russian Side forwarded the checked and corrected version of station history Database to U.S. Side, on Summer 1996.

2. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Future exchange activities will include updating those data sets previously exchanged with more current data. During 1996, several activities have taken place:

Russian Side will prepare and forward to the U.S. Side by the end of 1996:

1. the historical monthly mean data sets for humidity, pressure, and sunshine duration for 243 stations will be prepared at RIHMI to include data through 1994;
2. three-hourly and daily meteorological data sets for Russian stations from 223 stations of the former USSR will be updated from 1990 through 1991 and if possible, to 1994;

Russian Side prepared and forwarded to the U.S. Side on Summer of 1996:

3. snow data sets (data set STOS) updated to 1994;
4. CLIMAT message data for 243 stations collected from GTS for 1995.
5. the updated to 1994 and improved version of daily mean, minimum and maximum temperature and precipitation Data for 223 stations.

3. Marine Meteorological and Aerological Data

The COADS project is a U.S. project involving a partnership of U.S. organizations working to update and improve its global surface marine baseline database of ship and buoy reports which then becomes available to the worldwide research
community. In July 1996 RIHMI shipped to the U.S. the magnetic tape containing about 600,000 marine meteorological observations (data from Russian ships). The Russian side is interested in producing CD-ROMs containing COADS updates to Version 1 and 1a and intermediate releases, as well as COADS Version 2 Data (both observational data and statistics) and in receiving these CD-ROMs.

Roy Mendelssohn (National Marine Fisheries Service, Pacific Fisheries Environmental Group), along with NCAR, NOAA/ERL Boulder, and NOAA/NCDC Asheville have produced a CD-ROM set (5 CDs) containing the Release 1 plus interim (1854-1990) COADS observations. The data on the CD-ROMs is the same format as the primary archives at NCAR. These CD-ROMs provide convenient software to select data by parameter. Funding is being sought to continue this cooperative project with the end result being a set of CD-ROMs for COADS Release 1a (1980-1995). The Release 1 CD-ROMs are available for exchange now, and forthcoming CD-ROMs will also be available for data exchange when they are completed.

One set of these COADS CD-ROMs (5 CD's each) was presented to the Russian side in Aug 1996. Three other sets will be delivered to Russian side by the end of 1996.

4. River Flow Data

The All-Russian Research Institute for Hydrometeorological Information (RIHMI) in 1995 prepared data sets with monthly mean river flow for the rivers of Russia (272 observational platforms) with available data up to 1985 for 40 years or more. These data on two floppy disks were shipped to the U.S. in June 1995. The U.S. side prepared monthly data with long records for 295 US rivers and shipped them to RIHMI-WDC. There were a total of 17319 water years of data (average 59 years per station). Each side in 1995-1996 made their efforts to work with the Data obtained from the other side and had certain expertise in working with the river flow data of the other side. This had data for the period through 1988.

During 1996 more rivers were added by U.S. side (for a total of 454 rivers) and the set has been updated through 1995/96. This US work is by the USGS.

This data set was transferred to Russian side in August 1996. A more detailed analysis of river flow data of both sides is desirable.

5. Snow Data

The bilateral cooperation and data exchange between Russia and the U.S. has begun in 1996 by surface snow data study and exchange. CIRES and WDC-A for Ice and Snow, from the U.S. side, and Institute of Geography and RIHMI, from Russian side, are providing a joint work for investigation of snow cover change over the both countries in the last two decades. Snow cover data sets are prepared in both countries and available now for exchange and investigation. For this purpose the U.S. sent to Russia a decadal (ten-days means) snow cover data set for approximately 500 sites on the U.S. area for 1971-1990 and Russia sent to the U.S. the
same spatial density data set for 1966-1990. These data sets will be checked for compatibility and quality in both countries and used for analysis of snow cover change in both countries. Special attention was paid for updating for 1984-1994 and improving of the baseline daily snow depth data set for 283 of the USSR stations. This data set is an important part of any work for comparison of snow cover change over two countries for long period. Both Data Sets on Snow are shipped by Russian Side to the US Side, on Summer 1996. The US side shipped to Russia the Historical Snow Depth Daily Data, Vol. 1, (1 CD-ROM set).

Snow course transects made at 10-day to monthly intervals at approximately 800 stations throughout the Former Soviet Union for 1966-90 are now being assembled, quality-checked and documented at NSIDC. The measurements provide snow cover liquid water equivalent data based on 0.5 to 2 km long transects in fields or forests.

The data should be available for distribution in mid-1997.

6. Preparation of Bias-Free Data Sets

During 1996, the work on developing bias-free data sets continued at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention is given to improving daily minimum, maximum, and mean temperature data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades. Both NOAA/NCDC and RIHMI scientists will continue their work on the basis of these data.

7. Global Water Cycle

A more detailed version of this program (the publications, the plans, and the PIs involved) is in Attachment I. The studies of the global water cycle are divided into four parts:

1. Effects of cloud and snow cover on climate;
2. Surface turbulent heat fluxes;
3. Precipitation and snow cover in high latitudes;
4. Evaporation changes in the north extratropical land areas.

8. Soil Temperature Data Project

The exchange of soil temperature data was discussed. Both sides expressed interest in the exchange of these data, and in research involving these data.

9. Creation of 1961 Global Normals

NOAA's National Climatic Data Center completed the collection and preparation of 1961-1990 Global Climate Normals for the world Meteorological Organization (WMO) in the Summer of 1996. Data from approximately 130 countries have been
collected. Normals data were exchanged between NCDC and RIHMI in 1994. The Global Climate Normals have been sent to the WMO for publication in book form.

10. Preparation of CD-ROMs

Both sides consider that preparation of CD-ROMs is a good way to provide the various Data to the World's research community. RIHMI-WDC is able to distribute copies of CD-ROMs among the interested services and institutions within former USSR. The cooperation in this direction continues. Attachment 2 summarizes some of the activities to prepare CD-ROMs.

11. Translated Abstracts of Russian-Language Climate Change Publications

The Carbon Dioxide Information Analysis Center (CDIAC), in collaboration with the Research Institute for Hydrometeorological Information- World Data Center (RIHMI), Obninsk, published and distributed "Selected Abstracts of Russian-Language Climate-Change Publications: III. Aerosols," the third volume in the series. CDIAC and RIHMI continued preparation of fourth volume of this series "Selected Abstracts of Russian-Language Climate-Change Publications: IV. General Circulation Models" in 1996. It is expected to be printed by the end of 1996.

12. Numeric Data Packages (NDPs)

In cooperation with the All-Russian Research Institute for Hydrometeorological Information (RIHMI) - World Data Center, Obninsk, and NOAA's National Climate Data Center (NCDC), the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) continues to produce additional numeric data packages (NDPs), which are expected to be forwarded to Russian side within 1997.

The set of six CD-ROMs containing NDP-048 Data, "Three-Hourly and Six-Hourly Meteorological Data for 223 USSR Stations" was forwarded by U.S. Side to the Russian Side.

13. Greenhouse-Gas Monitoring Data

The Carbon Dioxide Information Analysis Center (CDIAC), in collaboration with the Main Geophysical Observatory (MGO), in St. Petersburg, archived atmospheric carbon dioxide concentration records derived from flask samples collected at five former USSR stations. CDIAC incorporated the monthly carbon dioxide concentration records into CDIAC's "Trends '93: A Compendium of Data on Global Change" (Brounshtein et al., 1994). The individual flask records received from MGO replaced those previously furnished and documented in a CDIAC numeric data package (Brounshtein et al., 1991).
14. Satellite Data Management

In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) have started to be received and registered at points of Yakutsk and Khabarovsk. The US provided on-land facilities for these goals.

Both Sides are highly interested to arrange the Database of these Data and to make it available for both sides. Ten DAT tapes with HRPT data from Yakutsk were transferred to the US side (for EROS center) in August 1996.

15. Development of Telecommunications

Both sides believe that access of RIHMI-WDC to INTERNET facilities is extremely useful for bilateral cooperation and for advanced Data exchange activity. RIHMI-WDC prepared the Proposal on Development of Telecommunications for RIHMI-WDC and on integration of RIHMI-WDC to INTERNET.

16. DATA EXCHANGES in 1995-1996

Forwarded to the U.S.:

The RIHMI provided their Upper-Air regional and GTS Data bases to be appended to CARDS Data Base Version 2, during 1995 1996.

The RIHMI provided to NOAA/NCDC the station history checked, corrected and updated data for the upper air stations.

The RIHMI shipped to the U.S about 660,000 marine meteorological observations (data from Russian ships)

The RIHMI provided to NOAA/NCDC the monthly CLIMAT Reports for 223 Russian stations for 1991-1995.

The Daily Snow Depth Data Set (STOS) for 1985-1994 for 222 Stations

Ten DAT tapes containing HRPT Data from reception station in Yakutsk were transferred to U.S. side.

The Data Set of Decadal (ten-days means) Snow Cover Data for 1970-1990 was forwarded to the U.S.

The updated to 1994 and improved version of daily mean, minimum and maximum temperature and precipitation Data for 223 stations. This Version corresponds to NDP-040 Data Set.
Forwarded to Russia:

The U.S. Side provided CARDS Data Version 1 for the period till 1992 to the Russian side, during 1995.

The U.S. provided a combined data set of U.S. upper air station history information and the Russian regional base station history information to the RIHMI.

A CD-ROM containing the NCAR/NCEP Reanalysis Project Global Atmospheric Analyses, was provided to the RIHMI.

One CD-ROM with Snow Depth Data for the former USSR was provided to RIHMI from WDC-A (Snow and Ice).

The U.S. forwarded 6 CD-ROMs with Data that correspond to NDP-048, to the Russian Side.

A set of monthly river flow data for 454 U.S. rivers was forwarded to Russian side.

A set of five CD-ROMs containing COADS Data was forwarded to Russian side.

One CD-ROM containing Arctic Ocean Snow and Meteorological Observations from Drifting Stations was forwarded to Russian side.

JOINT PUBLICATIONS:


The other publications are listed in Attachment 1.
PLANS FOR 1997

PROJECT 02.08-14: DATA EXCHANGE MANAGEMENT

U.S. Project Leader: Roy Jenne (NCAR)
Russian Project Leader: Marsel Shaimardanov (RIHMI-WDCB)

1. Upper-Air Data Development

1.1 Comprehensive Aerological Reference Data Set (CARDS)

In 1996-97, U.S. and Russian scientists will continue to build the Comprehensive Aerological Reference Data Set (CARDS). The CARDS will consist of three levels of data: level 1, raw data set without corrections; level 2, quality-controlled data set using the Complex Quality Control (CQC) software; and level 3, data set with some detected biases removed. Dr. Oleg Alduchov (RIHMI) will continue to enhance the CQC software during 1996-97 in Obninsk, Russia. The new version of CQC (version 2), which will be produced in 1996, will have several advancements. The new versions of CQC will be implemented without delays to produce new versions of CARDS Database level 2, which will become available as soon as possible to both sides.

Joint efforts will be applied in 1996-97 to Analyze CARDS Database, to prepare Informational Climatic Products on CARDS Database, with emphasize to Station Monthly Statistics Data Set. Work will also continue to develop cloud models for the goals of cloud data control. NCDC will consider the issue of CD-ROMs with CARDS-based Data and Information as a significant result of this Joint Activity. Selected temperature change climatological analysis based on CARDS Data, will be also provided in 1997. CARDS Version 2 Data Base that will become available to both sides.

Up to two RIHMI specialists may be invited to NCDC in late 1996-1997, for continuing and review of collaborative work on CARDS.

In 1997, the Russian side will forward to the U.S.: (1) The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas. (2) Informational Climatic Products as they are obtained from CARDS Databases, (3) Observational upper-air Data for 1991-1995 to be included into CARDS Database (4) Information on Station Histories to be included into new versions of Joint Station History Database.

In 1997, the U.S. side will forward to Russia: (1) The CARDS database versions for 1961-90, as data from additional sources are appended and processed jointly with existing data by the advanced versions of CQC software. (2) The CARDS Database for the period 1991-1995 (3) The CARDS Station History Database versions as they are produced.
Both sides believe that a publication on milestone concepts of CARDS as a Joint Project between NCDC and RIHMI, is desirable. WMO Bulletin is a possible issue for such publication. This publication is reasonable to contain the latest results obtained on CQC Version 2 implementation and on Analysis and Product Developments.

Both sides believe that comparisons and joint analysis of climatic time series obtained for the atmosphere from various data types and by various authors, will become a reasonable continuation of joint activity on U/A data.

1.2 Upper-Air Humidity Database Development

Both sides will consider to apply efforts to begin jointly producing Upper-Air Humidity Database for the goals of Atmospheric Water Climatological Change Study. This activity should be considered as a separate one, but the results obtained within CARDS Activity will be of value as a base. CRDF (Civilian Research and Development Foundation) is one of the possible ways to arrange support for such activity. By the end of 1996, NCDC and RIHMI will clarify the possible directions of the future work and detect the interested organizations and participants from both sides.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Alexander Sterin [RIHMI-WDCB])

2. Ship Data (COADS)

The Comprehensive Ocean-Atmosphere Data Set (COADS) Release 2 is scheduled to be completed in 1997-98 and will include all Russian observations from the earliest period through the latest available data at the time of the final processing cut-off. The All-Russian Research Institute for Hydrometeorological Information (RIHMI) will provide their possible updates of ship observations, both surface and upper-air, which will be sent to the National Center for Atmospheric Research (NCAR) in Boulder, CO. In return, RIHMI will be provided with COADS Release 1a and 1b intermediate updates (both observational and monthly Data) as they are produced, and with COADS Release 2 when completed.

(U.S. PI: Steve Worley [NCAR], Scott Woodruff [NOAA/Office of Atmospheric Research], Joe Elms [NOAA/NCDC], and Russian PI: Marsel Shaimardanov [RIHMI-WDCB])

3. River Data

In 1995, there was the exchange of monthly mean river flow data between the All-Russian Research Institute for Hydrometeorological Information (RIHMI) and the U.S. Geological Survey (USGS). The data has long records of flow for about 300 rivers in each country. In 1996 after the work with already exchanged data, both sides will prepare the monthly mean river flow data for the maximally available number of sites and period, to be exchanged bilaterally. The efforts to detect and to
remove inhomogeneities in data bases of both sides will be applied. The U.S. and Russian sides also will make efforts to study and detect the distortions resulting from human activities, in river flow data of both sides. Russia will check the possibilities to make the next equivalent exchange of river flow data.

After the data within this next equivalent exchange will be analyzed, then there could be a meeting of river data specialists of both sides to discuss these results.

(U.S. PI: Jim Slack [USGS] and Russian PI: Marsel Shaimardanov, Veniamin Semyonov [both RIHMI-WDCB])

4. Snow Data

The bilateral cooperation and data exchange between Russia and the U.S. was developed in 1996 by surface snow data study and exchange. This activity will continue in the future. CIRES and WDC-A for Ice and Snow from the U.S. side and RIHMI-WDCB and Institute of Geography from Russian side are planning a joint work for investigation of snow cover change over the both countries in the last two decades. Snow cover data sets are prepared in both countries and available now for exchange and investigation. Both sides will study the data sets of ten-days mean values of snow cover, which were exchanged in 1996. The exchange of ten-days means data on snow cover will continue in 1997.

Special attention will be paid for updating for 1984-1995 and improving of the baseline daily snow depth data set for 223 of the fUSSR stations (data set STOS). This data set is an important part of any work for comparison of snow cover change over two countries for long period.

US PI: Roger Barry (CIRES/WDC-A for Ice and Snow) and Russian PI: Vyacheslav Razuvaev (RIHMI-WDCB) and Alexander Krenke (Institute of Geography of Russian Academy of Science).

5. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Future exchange activities will include updating those data sets previously exchanged with more current data. During 1996-97, several activities will take place: (1) the historical monthly mean data sets for humidity, pressure, and sunshine duration for 243 stations will be prepared at RIHMI to include data through 1994; (2) three-hourly and daily meteorological data sets for Russian stations from 223 stations of the former USSR will be updated from 1990 through 1991 and if possible, to 1994; (3) snow data sets (data set STOS) will be updated to 1990 and, if possible, to 1994; (4) CLIMAT message data for 223 stations collected from GTS for 1996 will be prepared by RIHMI during January 1997; (5) the updated to 1993 and improved version of daily mean, minimum and maximum temperature and precipitation Data for 223 stations.

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The NCDC will update and send to RIHMI: (1) an update to 1994 versions of the Global Historical Climate Network data set; (2) daily data on an increased number of meteorological parameters for 120 stations for 1995; (3) three-hourly synoptic observations for the Worldnet stations for the period 1988-1994.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

6. Preparation of Bias-Free Data Sets

During 1996, the work on developing bias-free data sets will continue at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention will be given to improving daily minimum, maximum, and mean temperature data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades. Both NOAA/NCDC and RIHMI scientists will continue work on the basis of these data sets.

(U.S. PI: Thomas Karl [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

7. Global Water Cycle

Please see Attachment 1 for information about the plans for this project.

8. Preparation of CD-ROMs

NOAA's National Climatic Data Center (NCDC), in conjunction with the Carbon Dioxide Information Analysis Center (CDIAC) in Oak Ridge, Tennessee, is producing a CD-ROM of the regional three-and six-hourly synoptic observations for the period 1936-86. CDIAC in cooperation with RIHMI is preparing the data for the disk, and will issue a CD-ROM of the data in 1996. NCDC in cooperation with RIHMI will also utilize these data and available regional daily data in preparing climate summaries for the set of regional sites. These summaries will be included on the Version 4 of the International Station Meteorological Climate Summary (ISMCS) CD-ROM, that became available now.

Both sides believe that CD-ROMs (3-4 copies) produced by the U.S. Side, should be forwarded to RIHMI-WDCB, for further processing and/or dissemination among the interested organizations within Russia.

Plans on the issue of CD-ROMs with data on the project are contained in Attachment 3.

Both sides believe that preparation of data files and software files in final form (to be put on the CD-ROM Media) could begin now also in Russian centers. The sides
agree that it would be desirable for the Russian side to obtain the information on technology and processing necessary to prepare pre-master copies of CD-ROMs in Russia (with data and software). The issue of copies of such CD-ROMs could be provided by joint efforts on both sides. This activity could be discussed more in 1997.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Marsel Shaimardanov, Vyacheslav Razuvaev [RIHMI-WDCB])


Both sides will consider the possible ways to continue activity on translated abstracts and its possible outputs, if funding will be available.

(U.S. PI: Robert Cushman [ORNL/CDIAC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

10. Numeric Data Packages (NDPs)

In cooperation with the All-Russian Research Institute of Hydrometeorological Information (RIHMI) - World Data Center, Obninsk, and NOAA's National Climatic Data Center (NCDC), the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) proposes to produce additional numeric data packages (NDPs) based on expanded versions of the 223-station Russian climate data sets. The NDP-048 (6- and 3-hourly meteorological observations for 223 stations) will be updated with data through 1990.

(U.S. PI: Thomas Boden [ORNL], Peter Steurer [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI-WDCB])

11. Greenhouse-Gas Monitoring Data

In cooperation with the Main Geophysical Observatory, St. Petersburg, and the Institute of Global Climate and Ecology (IGCE), Moscow, the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) proposes to receive additional greenhouse-gas monitoring data from Russian stations for eventual publication as CDIAC numeric data packages and in CDIAC's "Trends '95: A Compendium of Data on Global Change." CDIAC proposes, as part of this project, reciprocal visits between Oak Ridge, Moscow, and St. Petersburg as budgets permit.

(U.S. PI: Thomas Boden [ORNL] and Russian PI: Alexander Shashkov [MGO], Felix Rovinsky, Vladimir Egorov [IGCE])

12. The Climate Study based on CLIMAT Message Database
NCDC of US and RIHMI-WDC are planning to begin joint research in improvement of databases which are obtained from CLIMAT messages. This activity will begin in 1997.

(U.S. PI: Gus Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuvayev [RIHMI-WDCB]).

13. Satellite Data Management

In 1996-97, activity will continue on satellite data exchange. In the Framework of MISSION TO PLANET EARTH Program, the U.S. NOAA Polar Orbital Meteorological Satellites numeric data (HRPT Data) has started to be received and registered at points of Yakutsk and Khabarovsk. The US provided on-land facilities for these goals. Both Sides are interested to arrange the Database of these Data and to make it available for both sides. In 1997 the availability of HRPT Data from Yakutsk station to both sides will be provided.

(U.S. PI: Roy Jenne (NCAR), and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

14. Soil Temperature Data Project

The main goal of this project is to organize soil temperature data sets for Russia and North America, to exchange the data for intercomparison and to undertake a joint assessment of soil temperature variations for the 2 countries. Such time series will provide a baseline for global change studies.

Tasks to be provided in 1996/1997 are to prepare a list of stations and variables, and preliminary data assembly and exchange of samples of data.

PIs from Russia:
D. Gilichinsky, Soils Institute, RAS, Pushchino
N. Romanovskii, Geocryology Dept., Moscow State University
A.N. Krenke, Inst. Of Geography, RAS, Moscow,
V. Razuvayev, RIHMI-WDCB, and

PIs from USA:    R.G. Barry, NSIDC, University of Colorado,
F. Nelson, Geography Dept., SUNY, Albany, NY
J. Brown, International Permafrost Association

15. Creation of 1961 Global Normals

NCDC will place the Global Climate Normals on CD-ROM and exchange these data with RIHMI in 1997.

(PI from U.S: Kenneth Hadeen [NCDC/NOAA], and PI from Russia: Vyacheslav Razuvayev (RIHMI-WDCB)).
16. Precipitation Data Rescue

A project to rescue precipitation data at RIHMI is planned to be initiated in 1997. The project will involve: (1) The rescue of aging 9 track magnetic tapes to newer media, (2) The digitization of precipitation data stored on manuscripts, and (3) The exchange of these data between Russia and the USA. Funding for this project will be sought from NOAA's Climate and Global Change program.

(PI from U.S.: Gus Shumbera (NCDC/NOAA) and PI from Russia Marsel Shaimardanov (RIHMI-WDCB)).

17. Surface Radiation Data and Turbidity

The networks of station radiation data were discussed. Data for radiation and turbidity are important for global change studies. It is planned to also discuss these data at the next meeting of data coordinators.

(PI from U.S.: Roy Jenne (NCAR), PI from Russia: Marsel Shaimardanov (RIHMI-WDCB)).

18. Development of Telecommunications

Both sides believe that access of RIHMI-WDC to INTERNET facilities is extremely useful for bilateral cooperation and for advanced Data exchange activity. The use of INTERNET NODE at Institute of Space Research (IKI) is a good possibility to solve the problem to connect RIHMI to INTERNET. The sides considered a proposal on development of Telecommunications at RIHMI-WDCB and will consider methods to achieve these goals.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDCB)

19. Compilations of Databases for Climate Study.

Both sides have discussed the possibilities of the creation of compiled databases for various components of the Climactic System. The sides will continue the consultations and will discuss at the next meeting.

(U.S. PI: Roy Jenne (NCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDCB))

20. Data Coordinator's Meeting

The next meeting of the data coordinators will be held at Russia on July-October 1997. Up to three (3) specialists from U.S. will be invited for up to seven (7) days.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])
21. Additional Exchange of Scientists

Up to three specialists from Russia may participate at 21 Annual Climate Diagnostics and Prediction Workshop in Huntsville, AL, in October 1996. This meeting will be used for discussing the status of preparation baseline data sets for climate research. Up to three specialists from Russia could participate the 22 Annual Climate Diagnostics and Prediction Workshop in U.S. in late 1997.

Dr. Oleg Alduchov will visit to NCDC in August 1996 for a period of up to 45 days to take part in improvement of U/A Data Complex Quality Control (CQC), in analysis of CQC errors and to participate in obtaining CARDS Version 2 Data Base that will become available to both sides. Up to two RIHMI specialists may be invited to NCDC in late 1996-1997, for continuing and review of collaborative work on CARDS. Pending the availability of funds, additional reciprocal visits of Russian and U.S. specialists will be considered for participation in international and bilateral meetings in support of the activities conducted within the framework of Project 14.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])

SUMMARY OF PLANNED 1997 DATA EXCHANGES

From the U.S. to Russia:

(1) The CARDS database Version 2 Data for all the possible period, as data from additional sources are appended and processed jointly with existing data by the Version 2 CQC Software, will be forwarded to RIHMI.

(2) The later versions of CARDS Database Data as soon as they will be completed, will be forwarded to RIHMI.

(3) The CARDS Database for the period 1991-1995 after updating by Data from additional sources and CQC Version 2 processing, will be forwarded to RIHMI.

(4) The CARDS Station History Database versions, as they are produced, will be forwarded to RIHMI.

(5) The NCDC will update and send to RIHMI on a regular basis the annual additions to the Global Historical Climate Network data set (Version 2).

(6) The U.S. side will send to RIHMI the updates to COADS Release 1a and 1b observational and statistics Data.

(7) As soon as COADS Release 2 will be prepared, it will be forwarded to Russian side.
(8) NOAA/NCDC will send to RIHMI six-hourly and three-hourly synoptic observations data set for the Worldnet stations for the period 1988-1995.

(9) NCDC will send to RIHMI the snow cover data set of ten-days mean values

(10) The U.S. Side will forward the CD-ROMs with NCAR/NCEP Reanalysis Project Data Sets, as they will be issued, to Russian side.

(11) GHCN Max and Min Temperatures for 1800-1996 Data Set will be forwarded to Russian side.

(12) WMO Climate Normals for 1961-1990 will be forwarded to Russian side.

From Russia to the U.S.:

(1) The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.

(2) Upper-Air Informational Climatic Products, as they are obtained from CARDS Databases

(3) Observational upper-air Data for 1995 to be included into CARDS Database

(4) Information on Station Histories to be included into new versions of Joint Station History Database

(5) The RIHMI will send to NCDC the historical monthly mean data sets for humidity, pressure, and sunshine duration for selected 243 stations up to 1994.

(6) Three-hourly and daily meteorological data sets for 223 stations will be updated from 1990 through 1991 for Russian stations and others, if possible, and sent to NCDC.

(7) Snow data sets (Data set STOS) will be updated to 1994 and sent to NCDC (for SNIDC).

(8) CLIMAT messages for 1996 for 243 stations will be sent to NCDC in January 1997.

(9) RIHMI will prepare monthly mean river flow data for extended list of stations and will forward them to the U.S.

(10) RIHMI will send to NCDC and WDC-A (USA) the ten-days means snow cover data set.

(11) RIHMI will send to NCDC updated to 1993 and improved version of daily mean, max. and min. temperature and precipitation data for 223 stations.
(12) RIHMI will prepare updates to marine surface meteorological and marine upper-air data and will send them to the U.S. side.

(13) Russian Side will forward to the U.S. Side the HRPT Data from NOAA Polar Orbital Meteorological Satellites as they are registered by reception stations located in Yakutsk.

History of the data exchange

The accomplishments of the data exchange during about 1990-1996 are summarized in Attachment 3.

FROM THE U.S. SIDE:

Roy L. JENNE,
NCAR
Project 02.08-14
Leader from U.S. Side

FROM THE RUSSIAN SIDE:

Marsel SHAIMARDANOV,
RIHMI-WDC
Project 02.08-14
Leader from Russian Side
Attachment 1

A brief report on activities during the period August 1995 to August 1996 in the framework of the Hydrological Cycle Studies item 14.8 of the 1995 Protocol on collaboration between the United States and Russia on in the field of the Protection of the Environment and Natural Resources (Working Group VIII: The Influence of Environmental Changes on Climate), and plans for more work.

The studies were carried out in four major research areas.

Report on Activities

1. Effects of cloud and snow cover on climate.

Empirical studies of cloud and snow cover effects on climate based on a blend of observational meteorological data for the past several decades were continued. This approach employs the idea that the analysis of climate variability observed during the period of intensive instrumental observations can provide "overall estimates" of these effects. A climatology of clear skies for northern extratropical lands was constructed in the form of deviations from the average climate conditions. Clouds are an internal component of the climate system, and these deviations indicate specific climate conditions associated with clear skies. At the same time, they may be considered as estimates of the overall cloud effect on the regional climate. A similar approach was applied to estimate the potential effect of snow on the ground, and an attempt was made to divide the effects of snow and clouds. These results have been presented in the following related papers:


d. Groisman, P. Ya., and R.S. Bradley 1996: "Internal consistency of cloud and snow cover parameterizations in the GCMs: Comparison with empirical data (in preparation)."
2. Surface turbulent heat fluxes.

The turbulent heat fluxes at the soil surface are not observed (or poorly observed) by existing observational systems. This affects our ability to reliably predict the consequences of climate changes on the hydrological cycle. Therefore, an approach to estimating sensible surface heat fluxes based on the theory of similarity, and using routine meteorological observations available in Russia, was developed (Groisman and Genikhovich 1996). This was possible for the former USSR territory (fUSSR) and some other countries, where the standard practice of hourly observations includes temperature measurements at the atmosphere - land-surface boundary and codes of the surface conditions (wet, dry, snow-covered, etc.). The approach is designed for use in climate change and/or climate feedback studies. A similar approach to estimating latent heat fluxes is developed, but only for saturated surfaces (wet and/or snow-covered). The method has been tested on several observational data sets.

The above methods were applied to the territory of the former USSR, using the 3- / 6-hourly data of 257 stations for the past several decades to assess the sensitivity of sensible heat flux to cloud and snow cover. This property was quantified for bare soil landscapes over the entire country. The estimates of "overall climate effect" on summer sensible heat flux are compared with similar estimates from three general circulation models (GCMs) to assess the abilities of these GCMs to reproduce the "response" of this flux to cloud cover change. It was found that when the effect of temperature depression associated with snow on the ground is excluded, the presence of snow on the ground generally is associated with less water vapor in the lower troposphere under clear sky conditions (while the evaporation rate and sensible heat flux are higher than average).

Related papers are:


3. Precipitation and snow cover changes in high latitudes.

Studies of precipitation changes and accuracy of precipitation measurements in high latitudes were continued. The results of these studies have been presented in several review papers prepared by international teams of scientists:


4. Evaporation changes in the north extratropical land areas.

A new effect of changes of evaporation over the northern extratropics (USA and Russia) during the past several decades has been discovered. Related paper is:

Plans for the next year.

We plan to advance in our understanding of the hydrological cycle by working in all four directions outlined in the above report. Specifically our WG-8 plans for year 1997 has the title: "Joint study of the variation of hydrological cycle over the U.S. and Russia".

This project has the following two sub-tasks:

(a) assessment of evaporation estimates based on standard meteorological observations delivered by the U.S. and Russian synoptic stations; and
(b) analyses of the structure of changes in daily precipitation over the United States and Russia.

Sub-task (a) will be implemented by an exchange of the time series of synoptic observations from 15 stations in the U.S. and Russia; these stations will be well distributed over the major climatic zones of both countries and located mostly in rural environments. The data will be used in joint studies of variability of hydrological cycle over both countries. The algorithms tested/developed will be applied on a larger scale to primary meteorological networks in the United States and Russia.

PIs from the U.S. side are Pavel Groisman, Tom Karl, and Tom Peterson (NCDC, Asheville) and from the Russian side Valentin Golubev (State Hydrological Inst., St. Petersburg), Eugene Genikhovich (Main Geophysical Observatory, St. Petersburg), and Vyacheslav Razuvaev (WDC-B, Obninsk).

Sub-task (b) will involve an exchange of the time series of daily precipitation from approximately 1000 stations from each side. It is understood, that significant efforts will be required from the Russian side prior to effect this data exchange. These efforts include retrieval and quality control of the national archive of daily precipitation. Therefore, a time frame for the transfer of Russian precipitation data will not be fixed on this stage.

PIs from the U.S. side are Roger Barry (NSIDC, Boulder), Henry Diaz (ERL, Boulder), Gus Shumbera and Pavel Groisman (NCDC, Asheville) and from the Russian side Vyacheslav Razuvaev (WDC-B, Obninsk) and Valentin Golubev (State Hydrol. Inst., St. Petersburg).
Attachment 2
Information about Possible CD-ROMs

Some CD-ROMs will be prepared that are based on data that has been exchanged under WG-VIII. A list of possible CD-ROMs follows:

1. Activities by CDIAC (Oak Ridge)

Comments from CDIAC: "We hope to be able to provide important data sets on CD-ROM. Two leading candidates are our recent numeric data packages of climate data from the former Soviet Union - NDP-040 (daily temp & precip for 223 stations) and NDP-048 (6- and 3-hourly met observations for 223 stations). Other candidates that would be of interest to RIHMI would be the Global Historical Climatology Network (GHCN, NDP-041) and a "snapshot" set of all the CDIAC NDPs. The major uncertainty, from out perspective, is whether resources will be available."

2. Plans by NCDC (WDC-A, Meteorology)

NCDC plans to be able to offer CD-ROMs as follows:

a. Extra-Tropical Cyclone Tracks (available now)
b. International Station Meteorological Climate Summary (ISMCS) (available now)
c. WMO 1961-1990 Climate Normals (available 1997)
d. CARDS Upper Air Products (available 1997/1998)

3. Monthly river flow data-plans by USGS

The plan is to put the US monthly rivers for exchange (about 454 rivers) and the Russian rivers onto a CD-ROM. Probably, one or two other datasets of monthly river data from other global locations will be included on the same CD-ROM. It may be possible to prepare this CD by about Dec 1997.

4. CD-ROMs by SNIDC (WDC-A, Glaciology), Snow & Ice data

a. Historical Soviet Daily Snow Depth

Daily observations of snow depth made at 283 WMO stations in the Former Soviet Union, using snow stakes in or near the meteorological enclosure, are assembled on a CD-ROM (NSIDC Product FE01092). The records begin in the late 19th century and go through 1985; the number of stations increases after 1966. Stations range in latitude from 35 degrees to 75 degrees North but are primarily in mid-latitudes (Figure 1). The CD-ROM contains daily data, derived monthly means, extraction software for the ASCII files and documentation. These data were provided by the
Hydrometeorological Service, WDC-B1, Obninsk under the WG VIII Data Exchange.

b. Russian N. Pole Data (meteorology, snow, clouds, radiation)

Russian North Pole (NP) Drifting Stations. Meteorological and snow observations from the NP program for 1937 and 1951-91 have been assembled on CD-ROM, to be released in August 1996. The variables are snow depth, snow surface temperature, snow density, water equivalent; meteorological data (air temperature, relative humidity, surface pressure, wind speed and direction, U-V components of wind, total and low cloud amounts, precipitation type and amounts); and solar radiation data (diffuse, direct, global, reflected, and net radiation; albedo). The observations are 3 (or 6) hourly and daily-averaged radiation data and meteorological data; daily, 10-day and monthly snow measurements. NP-1 operated from 1937-05-22 through 1938-02-19. NP-2 began on 1950-04/22, and at least one station, sometimes two, operated from that date until the end of NP-31 on 1991-03-31.

Two data reports are included on the CD-ROM:


The project was carried out on behalf of the WCRP Arctic Climate System program by AARI and the University of Washington; the CD-ROM was prepared at NSIDC with support from NOAA/ESDIM, NASA/EOSDIS and NSF/ATM.

PI (Russia)    Dr. V. Radionov    AARI
PIs (USA)      Dr. R. Colony    University of Washington (now Director,
                          ACSYS Project Office, Os6)
               C. Hanson    NSIDC

5. Preparation of Marine Surface Data on CD-ROMs

a. COADS observations on CD-ROM

Roy Mendelssohn (National Marine Fisheries Service, Pacific Fisheries Environmental Group), along with NCAR, NOAA/ERL Boulder, and NOAA/NCDC Asheville have produced a CD-ROM set (5 CDs) containing the Release 1 plus interim (1854-1990) COADS observations. The data on the CD-ROMs is the same format as the primary archives at NCAR. These CD-ROMs provide convenient software to select data by parameter. Funding is being sought to continue this cooperative project with the end result being a
set of CD-ROMs for COADS Release 1a (1980-1995). The Release 1 CD-ROMs are available for exchange now, and forthcoming CD-ROMs will also be available for data exchange when they are completed.

One set of CD-ROMs (5 CD's each) was presented to the Russian side in Aug 1996. Three other sets will be delivered to Russian side by the end of 1996.

b. Monthly summary statistics from COADS. NCAR, NOAA/ERL Boulder, and NOAA/NCDC Asheville produce a monthly summary statistics from the basic set of COADS individual observations. Following the completion of COADS Release 1b (1950-1979) and the Release 1a extension (1994-1995) we intend to create a CD-ROM containing monthly statistics for 1854-1995. Although the plans for completion of this work are not firm, we hope to have the CD's available near Dec 1997 or June 1998.

6. Data from the NCEP/NCAR reanalysis

   a. Monthly statistics from reanalysis
   b. CD-ROMs with more daily data. There will be one CD-ROM for each year. The US can offer 2 or 3 copies.
Attachment 3

This attachment provides a brief history of the data exchange for about 1990 through mid-1996.

1. The exchange of main climate data is mostly between NCDC (US) and RIHMI (Russia).

**USA CLIMATE DATA PROVIDED TO RUSSIA**
(through July 1996)

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<th>Type of Data</th>
<th>Spectral Range</th>
<th>Spatial Resolution Location</th>
<th>Approximate Geographic Location</th>
<th>Exchange Frequency or additional comment</th>
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<td>Global</td>
<td>Jan 1990 (4 tapes)</td>
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<td>Legates Precipitation</td>
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<td>Gridded</td>
<td>Global</td>
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<td>Global</td>
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<td>Daily data (add. Parameters)</td>
<td>1948-1988</td>
<td>120 sites</td>
<td>USA</td>
<td>Feb 1990 (2 tapes)</td>
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<td>Bradley gridded precipitation</td>
<td>Average</td>
<td>Gridded</td>
<td>Global</td>
<td>Apr 1990 (1 tape)</td>
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<td>2500 sites</td>
<td>Global</td>
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<td>Fixed ships</td>
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<td>Fixed ship</td>
<td>Global</td>
<td>Jan 1995 (1 tape)</td>
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<td>1989-1994</td>
<td>250 sites</td>
<td>USA</td>
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<td>Global</td>
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**RUSSIAN CLIMATE DATA PROVIDED TO USA**
(through July 1996)

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<th>Approximate Geographic Location</th>
<th>Exchange Frequency or additional comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily temp. and precip.</td>
<td>1884-1986</td>
<td>223 sites</td>
<td>FSU</td>
<td>Jan 1990 (3 tapes)</td>
</tr>
<tr>
<td>Monthly mean temperature</td>
<td>1891-1988</td>
<td>243 sites</td>
<td>FSU</td>
<td>Oct 1990 (1 tape)</td>
</tr>
<tr>
<td>Station histories</td>
<td>1890-1990</td>
<td>243 sites</td>
<td>FSU</td>
<td>Oct 1990 (3 diskts)</td>
</tr>
<tr>
<td>Three-hourly surface synoptic</td>
<td>1966-1986</td>
<td>223 sites</td>
<td>FSU</td>
<td>Nov 1990 (57 tapes)</td>
</tr>
<tr>
<td>Upper air data</td>
<td>1960-1978</td>
<td>57 sites</td>
<td>FSU</td>
<td>Dec 1990 (20 tapes)</td>
</tr>
<tr>
<td>Daily snow/other parameters</td>
<td>1874-1984</td>
<td>223 sites</td>
<td>FSU</td>
<td>May 1991 (6 diskts)</td>
</tr>
<tr>
<td>Update daily temp. and precip</td>
<td>1987-1989</td>
<td>223 sites</td>
<td>FSU</td>
<td>Sep 1991 (6 diskts)</td>
</tr>
<tr>
<td>Daily snow/heavily wooded</td>
<td>1966-1984</td>
<td>Fixed sites</td>
<td>FSU</td>
<td>Sep 1991 (1 tape)</td>
</tr>
<tr>
<td>Six-hourly surface obs.</td>
<td>1936-1965</td>
<td>223 sites</td>
<td>FSU</td>
<td>Oct 1991 (35 tapes)</td>
</tr>
</tbody>
</table>

*Continued on next page*
RUSSIAN CLIMATE DATA PROVIDED TO USA
(through July 1996) - continued

<table>
<thead>
<tr>
<th>Type of Data</th>
<th>Spectral Range</th>
<th>Spatial Resolution Location</th>
<th>Approximate Geographic Location</th>
<th>Exchange Frequency or additional comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly total precipitation</td>
<td>1890-1990</td>
<td>243 sites</td>
<td>FSU</td>
<td>Feb 1992 (2 diskts)</td>
</tr>
<tr>
<td>Update daily temp. and precip.</td>
<td>1990-1990</td>
<td>223 sites</td>
<td>FSU</td>
<td>Oct 1992 (2 diskts)</td>
</tr>
<tr>
<td>Update daily snow/other para.</td>
<td>1984-1986</td>
<td>223 sites</td>
<td>FSU</td>
<td>Oct 1992 (4 diskts)</td>
</tr>
<tr>
<td>GTS 6-hourly surface (no FSU)</td>
<td>1982-1988</td>
<td>Fixed site</td>
<td>Global</td>
<td>Apr 1994 (36 tapes)</td>
</tr>
<tr>
<td>Russian national upper air</td>
<td>1960-1990</td>
<td>Fixed site</td>
<td>FSU</td>
<td>Apr 1994 (30 tapes)</td>
</tr>
<tr>
<td>Update daily snow/other para.</td>
<td>984-1990</td>
<td>223 sites</td>
<td>FSU</td>
<td>Jul 1994 (6 tapes)</td>
</tr>
<tr>
<td>Update 3-hourly surface synop.</td>
<td>1984-1990</td>
<td>223 sites</td>
<td>FSU</td>
<td>Jul 1994 (30 tapes)</td>
</tr>
<tr>
<td>Update Russian national u/a</td>
<td>1991-1992</td>
<td>Fixed site</td>
<td>FSU</td>
<td>Nov 1995 (8 tapes)</td>
</tr>
</tbody>
</table>

2. Accomplishments of the River Data Exchange

Discussions of a possible exchange of river runoff data started about 1986. Each side prepared a list of rivers with long data records for possible exchange. The lists included about 450 rivers for each side. The progress includes:

a. Russia to USA
   2/90: initial list of stations
   4/91: data for about 10 sample rivers
   6/95: monthly data for 272 stations (thru 1988)

b. USA to Russia
   8/91: Initial list of stations
   7/95: monthly data for 295 stations (thru 1988)

3. Exchange of Marine Surface Data

The exchange of marine surface data between Russia and the U.S. began in 1989 and is continuing. The Tables below show that the primary MORMET archive was received at NCAR during 1989-1990 (approx. 23 million records), and near annual additions have been received since then. Reciprocating, COADS has been transferred to RIHMI as it has become available.

98
### Marine Surface Data from Russia (RIHMI) to the U.S. (NCAR)
(* data due to arrive or planned for exchange during 1996)

<table>
<thead>
<tr>
<th>Recv. Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989-1990</td>
<td>MORMET primary archive, data for 1888-1987</td>
</tr>
<tr>
<td>Feb. 1991</td>
<td>MORMET additional data</td>
</tr>
<tr>
<td>Feb. 1993</td>
<td>MORMET additional data</td>
</tr>
<tr>
<td>Feb. 1994</td>
<td>MORMET additional data</td>
</tr>
<tr>
<td>Feb. 1994</td>
<td>Keyed data from the S.O. Marakov Logbook</td>
</tr>
<tr>
<td>Jul. 1995</td>
<td>MORMET additional data</td>
</tr>
<tr>
<td>xxx. 1996</td>
<td>*MORMET additional data</td>
</tr>
</tbody>
</table>

### Marine Surface Data from the U.S. (NCAR) to the Russia (RIHMI)
(* data due to arrive or planned for exchange during 1996)

<table>
<thead>
<tr>
<th>Send Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxx. 1996</td>
<td>*COADS Observations 1950-1979, Release 1b</td>
</tr>
</tbody>
</table>
The US-Russian Data Exchange Meeting
(Aug 3-10, 1996)

The Russian visitors (Marsel Shaimardanov and Alex Sterin) were here in Boulder from August 3-10. It sure was a busy week! I want to thank a number of you for taking part in the meeting or providing inputs. A copy of the agreements is available (or enclosed). Most items are in the text from the meeting. A few more notes follow:

1. River data.

It helped that Jim Slack (USGS) had added more rivers (for 454 total) and updated the data. The Russians plan to match what the US has done. They are still having some problems with the internal processing of their river data.

2. Snow data.

It seems to me that good progress is being made on snow data and on related studies. We are getting closer to having datasets of regular snow data, mountain snow, precipitation, temperature, radiation, and river runoff. These are all needed for some studies. I am glad that Roger Barry (SNIDC), Mike Gillespie (USDA), and Pete Steurer (NCDC) could all contribute to this subject at the meetings.

3. Mountain Snow Data such as Snotel.

Mike Gillespie from USDA gave a presentation about Snotel, etc. These stations measure snow water content, and precipitation in the mountains. I think that it would be useful to arrange for the water resource people in each country to directly work with each other. It is likely that a Snotel representative (probably Mike?) will be invited to attend the meeting of coordinators in Russia in summer 1997. The Russian visitors asked me whether the U.S. was providing data for the appropriate rivers where Snotel data may be available. We need to remember this question.


We got a start with these types of data. We will prepare more information and discuss it again next year. See J. of Climate, June 1996 for information about the Russian observing net. This shows that the surface solar radiation has been decreasing since 1960, the cloudiness has increased, and the turbidity has increased. In the 9 Aug 1996 Nature, Arking compares observed radiation and climate model radiation. He says that the model overestimates the solar radiation absorbed at the surface by 10 to 15 w/m². This is rather big. He talks some about the datasets of observed radiation, at top and bottom.
5. Internet and communications for their center in Obninsk.

RIHMI in Obninsk has agreements to link up with the space center in Moscow (which has NASA help). They need money for data routers and high speed modems, and for a server. It seems that they also want a local network. I said that we wanted a more itemized cost breakdown and that we would bring the proposal to interested people in the U.S. See Proposal #1, attached.

6. The regular climate data.

A lot of this data flow has been between NCDC and Russia. The updates are very important and are continuing. Read the report for information.

7. Surface Marine Data.

The programs to exchange ship data with Russia and add data to the COADS dataset are coming along well. COADS is a joint project between NCAR, NOAA/ERL, and NCDC. Many other world labs contribute data and expertise. Steve Worley gave a talk on COADS and the US-Russian exchange.

8. The collection of CO₂ data for Russia.

I assumed that the Oak Ridge collection of CO₂ flask data will continue. I had up to date information about the other Oak Ridge projects.


The Russian side gave me a proposal entitled, "Comprehensive Cooperative Data Base (CCDB): Creation and Study." They note the success of efforts like COADS and CARDS and want to prepare other datasets on a joint basis. They also are hoping to define projects that could attract funding.

They propose that various component datasets would be prepared (UA raobs, sfc marine, daily surface temperature, surface land synop, etc.), there would be many checks between them, and data would be improved on the basis of the checks, etc.

I am for projects that gather data of a given type from various sources, clean up the component datasets, and do a periodic merge. The archives need to be kept for these three levels. It is almost more important to have the clean component datasets than it is to have the merge.

Their proposal sounds very global in scope. I have noticed that when actions are too global there is a danger that the work becomes too complicated, the data might be hurt, it costs extra money, and often little is accomplished. Then it sounded as if the intercomparisons might be done with derived products, such as monthly means, which is usually a good idea.
I said that the U.S. goals also were to gradually prepare a series of very good global datasets for various types of data. These often need to use a series of different collaborations. They are looking for a project that could be funded. They are also interested in developing a data system. I think that the emphasis in WG VIII should be to exchange data, clean it up, and offer good access to users (mainly by CD-ROM and Exabyte). Some added software support could be built on top of this technology. We left it open for further discussion. Please see proposal #2 attached.

Thanks go to Ken Hadeen and Gus Shumbera for quick input on the proposal.

10. Making CD-ROMs.

The Russians keep reminding me that it is very useful to obtain data on CD-ROMs. If I slow down a bit, they remind me that I first told them about this technology. It is time for them to obtain information about how to prepare a CD-ROM for themselves. This may be a mixed blessing for us all, but it is still a good idea. In any case, the data files must be separately exchanged. In this year's text, there is a section about U.S. plans for CD-ROMs.

11. Colorado Climate Center at Colorado State University.

On August 7, we visited with Nolan Doesken at CSU for 1.5 hours. The Russian visitors were impressed with the state work going on, and the enthusiasm applied to it. Thanks Nolan!

12. Other Data and Projects.

This cover memo only covers part of the data and projects. Please read the text, "Report of the Data Exchange Coordinators Meeting," dated August 1996.


Pete Steurer represented NCDC. He brought along lists of the 5-year accomplishments for normal climate/weather data which are included in the report (not planned for every year). Information for other types of data was added.

14. Overall impression.

I think that these data exchange projects are coming along very well. A lot has been accomplished.
PROPOSAL ON RESEARCH AND DEVELOPMENT PROJECT

Name of Project:

THE DEVELOPMENT OF TELECOMMUNICATIONS IN RUSSIAN RESEARCH INSTITUTE
FOR HYDROMETEOROLOGICAL INFORMATION - WORLD DATA CENTER

Abstract:

Russian Research Institute for Hydrometeorological Information
-World Data Center B (RIHMI-WDCB), - is an institution of Federal
Service of Russia for Hydrometeorology and Monitoring of Environment,
responsible for Environmental Data collection, processing, archival,
management, analysis, and support of possible customers. RIHMI-WDCB
has an unique collection of data in meteorology, hydrology,
oceanography, satellite data, etc. This Project is to Develop the
telecommunications in RIHMI-WDC, to enable access to Data and
Information on the base of full-scale INTERNET services, to integrate
RIHMI-WDC into INTERNET media, and to make more productive the
international, and bi-lateral (between U.S. and Russia), - data
and information exchanges.

Current Status and Relevant Previous Work:

Russian Research Institute for Hydrometeorological Information
-World Data Center B (RIHMI-WDCB), - is an institution of Federal
Service of Russia for Hydrometeorology and Monitoring of Environment,
responsible for Environmental Data collection, processing, archival,
management, analysis, and support of possible customers. RIHMI-WDCB
has an unique collection of environmental data on:
-surface meteorology,
-upper-air data (sondes),
-hydrology,
-oceanography,
-marine meteorology and aerology,
-coastal data,
-snow and ice measurements,
-data from meteorological satellites, etc.

The data are both in hardcopy form and on the computer media.
The RIHMI-WDCB possesses the collection of mentioned above
environmental data both for historical period and for the
current-moment data, as streams of current observational data are
collected operationally from GTS and from the other sources. The
total volume of data collected on computer media, is about several
millions megabytes. The monthly increase of this amount is of the
order of thousands megabytes.

RIHMI-WDCB is an active participant of
International and Bi-lateral (with U.S. Institutions) Data-Related
Projects. Among these Projects:
a)Bi-Lateral Data Exchange between U.S. and
Russian Federation in the Framework of U.S. - Russian Agreement on
Cooperation in Environmental Protection, WG-VIII: "The Influence
of Environmental Changes on Climate", Project 14: Data Exchange
Management
b)Project CARDS (Comprehensive Aerological Reference Data Set) between
NCDC/NOAA and RIHMI-WDCB

c)Bi-Lateral Oceanographic Data Exchange between U.S. and
Russian Federation in the Framework of U.S. - Russian Program on
Investigation of World Ocean

d)Project on Oceanographic Data Archeology and Rescue.
e)The Project on Agreement between NASA and Federal
Service of Russia for Hydrometeorology and Monitoring of Environment,
on collection of HRPT Data from NOAA's Meteorological Satellites in
Yakutsk and Khabarovsk.

ClibPDF - www.fastio.com
Such Centers as RIHMI-WDCB, in order to provide successfully their functionality, need to have access to INTERNET facilities. At the moment, almost all World Data Centers, including those on the territory of Russian Federation, have the opportunities of wide usage the INTERNET for dissemination, exchange and access to Data and Information.

At the current moment, RIHMI-WDCB has e-mail facilities, but still has not opportunities to arrange full-scale access to INTERNET. The main difficulty in arrangement full-scale access to INTERNET, is the non-developed technical base within RIHMI-WDCB for these goals.

On the other hand, RIHMI-WDCB currently has certain other prerequisites for arrangement of INTERNET media. Among them: telecommunication channels, personnel that has certain expertise in support of telecommunications, communications to the networks based on the use of Internet-protocols, etc. In case of one-moment or short-period support for developing and expanding technical base, these factors will be involved and are believed to successfully provide, in future, the support of the operationality of Internet for RIHMI-WDCB.

Project Narrative:

The Project presumes that the technical base for arrangement of Internet at RIHMI-WDCB, will be expanded. This will enable to create a communicational node at RIHMI-WDCB, equipped by proper facilities (such as fileserver for FTP access to large-volume databases, high-speed modems, routers, etc.). The specialists at RIHMI-WDCB, which support various types of environmental databases, will be provided by regular access and service.

The Project should be a short-period, the fundings will be directed mainly to the obtaining the technical facilities for node arrangements, and to their implementation.

Anticipated Results of Project:

The anticipated results of project are as follows:
- integration of RIHMI-WDCB as that of World Data Center with a unique Data collection, to the world community of information access and exchange;
- arrangement of RIHMI-WDCB’s Homepages, Fileservar and other communicational attributes, and open access for the customers of INTERNET to them;
- arrangement of access to reference information about Russian Environmental Data holdings, including RIHMI-WDCB and other organizations, which have such data holdings,
- arrangement of exchange by various kinds of Data and Information;
- the principally new level of current and future data-related projects between U.S. and Russian sides

Project Budget:

The requested approximate budget for this Project is $80,000. This budget will include:

- Equipment for arrangement of node at RIHMI-WDCB $50,000
- Support to personnel for implementation of equipment $16,000
- Travel $6,000
- Overhead for Funding Transfer 10% (?) $8,000

Total: $80,000

The equipment list could be itemized after any solutions could be made, considering equipment & costs existing at that moment.

The probable source of fundings could be one of the Agencies, such as NOAA, NASA, UCAR, etc., or a cooperative base of fundings shared between them.

Due to limitations, fundings for travel could be considered as
optional. In case the of providing the mechanism of funding transfer without overhead payments, this item of budget could be excluded. In this case, the minimized budget could be estimated as $66,000.
PROPOSAL ON RESEARCH AND DEVELOPMENT PROJECT

Name of Project:

COMPREHENSIVE COOPERATIVE DATABASE (CCDB): CREATION AND STUDY

Aug 1996

Abstract:

This Project is to develop the Comprehensive Cooperative Data Base (CCDB), which would include the observational data for various components of Climatic System (ocean, land surface, atmosphere) from various observational platforms. The data from all available sources are planned to be included. This data base will be constructed so that it will enable to provide complex climate studies, climate modeling, and support of environmental information customers.

Current Status and Relevant Previous Work:

At the current moment, the state of Databases of environmental data, of various types, from various platforms, in various countries and agencies, etc., - differs essentially. Most of the Data are on different archival media (computer or hardcopy), in different formats, in different units, are provided or not provided by information on observational methodologies, etc. However, some efforts during the last time were done to collect some types of observational data from various national collections, to transform them to a single unified format, to apply the procedures of their control and, finally, to develop the bases of information on information (metadata), which reflects the history of observations, changes in observational sites and instruments, etc., to provide their full-documented descriptions, and updates by current data.

As a sample of such approach, the COADS (Comprehensive Ocean-Atmosphere Data Set) may be considered. In full degree, the unified approach to create the comprehensive data set for Upper-Air (U/A) Data, was reflected in the jobs over Comprehensive Aerological Reference Data Set (CARDS), which is a joint project between National Climatic Data Center (NCDC/NOAA) and Russian Research Institute for Hydrometeorological Information - World Data Center (RIHMI-WDC) of Federal Service of Russia for Hydrometeorology and Environmental Monitoring. Within this Project, the unified formats of upper-air data and of station history data were prepared, observational U/A data from various national sources, were transformed into that unified format, the Complex Quality Control was applied to the observational Data, the study on detection of inhomogeneities was performed, and the preparation of climatic products on the base of the CARDS observational database has begun. The expertise of joint international cooperation in creation of COADS and CARDS will be useful in this Project.

Project Narrative:

This Project is planned to develop the Comprehensive Cooperative Data Base (CCDB), which will be the highest level of approach to create a comprehensive data set. While COADS and CARDS Projects consider one type of platform as source of data (marine meteorology, or U/A observations), - the CCDB Project will include the efforts to collect the observational environmental data from all of the platforms, such as:

- surface meteorological data;
- upper-air data (sondes);
- river flow data;
- oceanographical data;
- marine meteorological and aerological data;
- data on snow, ice;
- data from satellites.
These data from various platforms should be considered as various block of CCDB.
The following principles will be considered as a basis for realisation of the Project:
- the collection of data from various sources, including national and international collections,
- the work over unified formats, and transformation into these unified formats,
- the data control procedures to be applied to all of the observational data. The Complex Quality Control Procedures should be more advanced than those for separate types of data, due to simultaneous access to data and from different platforms and from different observations,
- in parallel to observational databases, the metadata databases will be developed and supported,
- the inventorying database will be constructed, developed and updated on a regular basis,
- there will be provided mechanisms for joint access to data of various blocks of CCDS, for joint processing of data of various blocks of CCDS, and for their joint presentation,
- there will be provided mechanisms to regularly update the blocks of CCDS by current observational data from various sources,

The study and analysis of CCDB contents should be provided, as a part of jobs over the Project.
The calculational derivatives and products for climate study should be provided as one of jobs over the Project.
Depending on the level of development, the Comprehensive Data Sets, such as COADS, CARDS, etc., should be included in the CCDB with certain changes or advancements, as the base for CCDB blocks.

Anticipated Results of Project:

The combined Database of high-quality observational environmental data of various types and from various observational platforms, for the goals of climate study and modelling, will be constructed.
All of the observational data will be supported by information on observations, so that metadata support will be provided.

The contents of this combined Database will be studied and analysed, to detect its strengths and weaknesses, and to choose ways of its possible improvements.

The possibilities of access to Data of this Database, including special software, telecommunicational facilities, etc., will be provided.

This Database (as a whole, as well as its separate parts and components), - will become available to the World Community.
Data Exchange Project of Working Group VIII

This project has been functioning since about 1975. Jenne has been involved since about 1980. NCDC has been a big participant since about 1990, DOE (Oak Ridge) since about 1988, USGS since about 1990, Roger Barry since about 1985, etc. These dates are estimates.

We have exchanged much data as shown on the attached sheets. The data coordinators on each side meet once each year (in either Russia or the US) to discuss the projects and agree on a written plan that includes projects, data to be exchanged, and plans for scientific visits. The most recent meeting was in August 1996 (at NCAR, Boulder) and included the participants:

- Two from Russia (Marsel Shaimardanov and Alex Sterin)
- Pete Steurer, NCDC, Asheville (surface and UA data)
- Jim Slack, USGS, Reston (river data)
- Mike Gillespie, USDA, Mountain snow, Denver
- Roger Barry, Snow and Ice, Boulder
- Nolan Doesken, Colorado Climate Office, CSU
- Roy Jenne, Dennis Joseph, Steve Worley, NCAR
- Other staff of Data Support, NCAR

Plans for next year:

a. Carry on many projects in UA, surface, hydrology, etc.

b. Start more investigation of radiation data

c. Keep up the progress on snow data
   (Please see the August 1996 document-28 pages long).

d. Start sending NCEP/NCAR reanalysis data to Russia.

Purpose of this task

Our data exchange project was one of the main exchange projects in W.G. VIII. During 1997-2000 it has been the only project. About 1998 a person in NOAA wanted to terminate W.G.-VIII. But no one wanted to stop it as long as our exchange project was working well. The US state Department argued to keep it going.

This task outlined (in 4 pages) what we have accomplished.

Roy Jenne, Aug 2000
Data to Describe the Arctic Atmosphere

Two projects are now being carried out that will provide much information about the state of the Arctic atmosphere, and about the changes over 40 years (1957-1996). The first project is to gather more of the past observations for the Arctic and to prepare them for computer use. The second project is to use modern methods to use all global observations (including those in the Arctic), to prepare new analyses of the global atmosphere. These new analyses can be used for studies such as:

- climate variability in the Arctic
- climate change
- pollution transport

1. Model Assimilation of Data

Modern methods to prepare analyses combine the best of analytical methods with the capability of the best forecast models. These are called data assimilation methods. The forecast models permit us to obtain rather good analyses over places like the N. Pacific Ocean where there are not a lot of observations. The models also give us a lot of diagnostic information about precipitation, radiation, clouds, etc. To help evaluate the output from reanalysis, these data are compared directly with other surface measurements (e.g., precipitation, snow, radiation) and satellite measurements (the earth's outgoing longwave and shortwave radiation, ocean precipitation, cloud data, etc.).

For more information see the NRC report: *Four-Dimensional Model Assimilation of Data*, (A strategy for the earth system sciences), 1991.

2. The NCEP/NCAR Reanalysis Project (prepare data for 1957-1996)

There is a large project to reanalyze the global atmosphere for 40 years (1957-1996). Analyses are prepared every six hours. The resolution is 208 Km in the horizontal, and there are 28 levels in the vertical. This project uses data assimilation methods.

In Feb 1996, we finished doing 17 years of data (1979-1995). The output looks good.

The output includes the usual wind, temperature and humidity in the whole atmosphere. It also includes estimates of precipitation, surface radiation, clouds, surface temperature, etc.

There are several levels of analyses in the boundary layer. Therefore, the output should be useful to study the movement and diffusion of pollution.

Will the analyses be good over the Arctic where the observations are often few? First, the forecast models will be able to do a rather good job of producing good Arctic analyses by using data from around the Arctic. Satellite sounders will help during 1973-1996. Because of the special data efforts, some in-situ observations will be available over the interior portion of the Arctic. Therefore, we think that the analyses for the Arctic will be good—and much better than anything available before.

Projects to prepare reanalyses will be seen as some of the big projects for the atmosphere and ocean sciences during the 1990s.

Note: I gave a talk about this at a state department US-Russia meeting in Moscow in May 1996.
3. Data for the Arctic

We are putting a certain focus on including data for the Arctic in reanalysis so that analyses there will be good. This data has not been completely assembled yet, but it includes:

1. Russian North Pole Raobs (Apr 54 - Feb 1986)
   One or two stations at any one time. Data for sfc - 700 mb, higher data ready about Aug 1996. These are stations located on drifting ice.

2. Surface data for Russian stations on arctic ice.

3. Land raobs for stations surrounding the Arctic Ocean, including the islands (1950s-on).


5. Data from surface ice buoys from Polar Science Center, U. Washington.


7. Three ice stations, from center of Greenland ice cap from Stearns, U. Wisconsin.

8. We have cooperative work with the above and with Scott Woodruff (ERL/CIRES) and Claire Hanson (SNIDC).

Other texts have a partial summary of Arctic data. Also, I have a short text, "Arctic Raobs," 12 Nov 93 that needs to be updated.


Some of the arctic data will not be available for another two years or more. Another reanalysis is planned that will include a new set of model improvements and some of the added data. The plans for another reanalysis will require some continuity in funding, which may become uncertain.

Note: NCEP is a part of the National Weather Service (in NOAA). NCAR (National Center for Atmospheric Research) is a laboratory under NSF.
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH
SCIENTIFIC COMPUTING DIVISION
P.O. Box 3000 Boulder, Colorado 80307-3000
Fax Number: (303) 497-1298

FACSIMILE COVER SHEET

TO
Name: Renee Tatusko
Location: NOAA
Fax Number: 301-713-1459
Phone Number: 

FROM
Name: Roy Jenne
Location: NCAR
Fax Number: 303-497-1298
Phone Number: 303-497-1215

We are sending 3 pages (INCLUDING cover sheet). If you do not receive all of these pages, please call (303) 497-1272. or 497-1231

DATE: 4/18/96 TIME: 11:00am

MESSAGE: "Data for describe the Arctic Atmosphere"

Note: Renee coordinated the US side of WG-VIII until about 1997
Then the office shut down --- but our data exchange continued

— Roy Jenne
U.S. - Russia Agreement on Cooperation in the Field of Protection of the Environment and Natural Resources

Working Group VIII:
The Influence of Environmental Changes on Climate

PROJECT 02.08-14: Data Exchange Management

DATA EXCHANGE COORDINATORS MEETING
(Obninsk, RUSSIA, 10-15 July 1995)

(IMPLEMENTATION REPORT AND PLANS FOR 1996)

REPORT ON IMPLEMENTATION

EXCHANGE OF SCIENTISTS:

During July, 9-15, 1995 Drs. Roy Jenne (NCAR, U.S. National Coordinator on Data Exchange), and August Shumbera (NCDC, WDCA on Meteorology, Director), visited Russia to participate the meeting of U.S. and Russian National Coordinators on Data Exchange. While visiting RIHMI-WDC, Obninsk, they discussed the accomplishments on Data Exchange in 1995 and plans for future Data Exchanges in 1996. While visiting Roshydromet and NPO PLANETA in Moscow, they discussed probable directions of Satellite Data Management for Climate Study. While visiting Institute of Space Research (IKI) and Geophysical Center of Russian Academy of Science in Moscow, they discussed the opportunities of establishing telecommunications for prospective developments of Data Exchanges.

NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) exchanged upper air data and collaborated on the joint development of the Comprehensive Aerological Reference Data Set (CARDS). Up to two RIHMI specialists may be invited to NCDC for periodic review of collaborative work on CARDS.

During 1995, Dr. Pavel Groisman (State Hydrological Institute) continued his affiliation at University of Massachusetts. His collaborative work is included under "Joint Publications."

Up to three specialists from Russia may participate at 20th Annual Climate Diagnostics Workshop in Seattle, WA, in October 1995. This meeting will be used for discussing the status of preparation baseline data sets for climate research.

JOINT COLLABORATION:

1. Upper-Air Data Cooperation (CARDS Project)

In 1995, U.S. and Russian scientists continued to build the Comprehensive Aerological Reference Data Set (CARDS). The U.S. Specialists continued to load the Upper-Air Data received from RIHMI-WDC, into the CARDS Database in the CARDS Standard Format. In a continuation of his NRC fellowship until June 1994 at NCDC, Dr. Oleg Alduchov (RIHMI) worked in late 1994 and in 1995 to complete Version 2.0 of the Upper-Air
Complex Quality Control (CQC) Software. This Version is based on advanced climate statistics which were prepared on CARDS Data for 1986-1990. This version also contains graphical components to improve the interface to Data. RIHMI-WDC continued to use 486 PC Computer and EXABYTE Tape Drive loaned by NCDC to support works on Control Procedures Improvements and to provide the access to CARDS Data for the Russian side. The U.S. Side provided CARDS Data for 1981-1990 to the Russian side in middle of 1995. The CARDS Data for 1961-1980 will be provided during 1995. The Russian side will provide their Upper-Air regional and GTS Data bases to be appended to CARDS Data Base, during 1995. Version 2.0 of CQC is expected to be implemented for CARDS Data during 1995.

The job for the goals of temperature correction model on determination of bases, tops and cloud amounts for low, medium, and high clouds from radiosonde soundings is also performed in the framework of this activity. NCDC and NCAR provided a Hard Disk of 9 gigabyte volume for the goals of jobs on CQC improvements and Upper-Air Data exchanges.

The possibilities to support the jobs on CARDS Database Analysis and preparing Upper-Air Climate Informational Products, as well as jobs on CQC and cloud data adjustment, will be considered by the U.S. Side in 1995. Both sides applied their efforts to produce and to update the combined Upper-Air Station History Database. Specialists of RIHMI-WDC contributed their estimates of free atmosphere temperature variations based on high quality data from global network, for the period 1993-1994, to:


2. Marine Meteorological and Aerological Data

The COADS project is a U.S. project involving a partnership of U.S. organizations working to update and improve its global surface marine baseline database of ship and buoy reports which then becomes available to the worldwide research community. In May 1995 RIHMI shipped to the U.S. the magnetic tape containing about 550,000 marine meteorological observations (data from Russian ships for the period 1983-1993)

A magnetic tape containing marine aerological observations for the period 1958 - 1992 (more than 100,000 observations) will be shipped to the U.S. during 1995. A magnetic tape containing sea surface temperature data for 1992-1993 (2 * 2 degs for monthly and 1 * 1 degs for weekly data) was shipped from the U.S. (NCAR) to the RIHMI.

Russian side is interested in producing CD-ROMs containing COADS updates to Version 1 and 1a and intermediate releases, as well as COADS Version 2 Data (both observational Data and statistics) and in receiving these CD-ROMs.

3. Information on Extratropical Storms

Both NOAA's National Climatic Data Center and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) have been digitizing track information on extratropical storms for many years. These databases were exchanged between the two organizations; and in March 1994, NCDC released a CD-ROM containing global tropical cyclone track information and both the NCDC and RIHMI extratropical cyclone files. They were maintained as separate files since they covered different periods of record and geographic areas.

4. River Flow Data

The All-Russian Research Institute for Hydrometeorological Information (RIHMI) in 1995 prepared data sets with monthly mean river flow for the rivers of Russia (272 observational platforms) with available data up to 1985 for 40 years or more. These data on two floppy disks were shipped to the U.S. in June 1995. The U.S. side prepared similar data for the rivers of U.S. and shipped them to RIHMI-WDC. Each side will make efforts to work with the Data obtained from the other side. Their expertise will be considered in adjustment of 1996 Plans for river Data exchanges.
5. Inventorying of Foreign Publications

NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) are comparing their holdings of published climate data provided by foreign countries. During 1994, RIHMI provided to NCDC a copy of their library cards of foreign publications. NCDC has initiated a comparison of the two holdings.

6. Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NOAA's National Climatic Data Center and the All-Russian Research Institute for Hydrometeorological Information. During the past year, the following data sets previously exchanged, were updated: (a) monthly CLIMAT reports from 190 Russian stations for 1994; (b) the daily data for increased number of meteorological parameters from 120 U.S. stations for the period 1989-1994.

7. Preparation of Bias-Free Data Sets

During 1995, the work on developing bias-free data sets continued at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention is given to improving daily minimum, maximum, and mean temperature data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades.

8. Global Water Cycle

8.1. Empirical approach of studying the snow cover feedback (Karl et al. 1993, Groisman et al. 1994a,b) was expanded for the cloud feedback problem and to the problem of turbulent heat fluxes evaluation (and their changes with snow on the ground and/or cloud cover variations). This work is being continued at the University of Massachusetts by Dr. Pavel Ya. Groisman (formerly with the State Hydrological Institute) and Prof. Raymond S. Bradley, at NOAA's National Climatic Data Center (Dr. Thomas R. Karl), at the State Hydrological Institute (Dr. Kirill I. Selyakov), and at the Main Geophysical Observatory (Dr. Eugene L. Genikhovich). First publications and conference papers were submitted/delivered on this topic.

8.2. The evaluation of the accuracy of several U.S. rain gauges at the Valdai precipitation polygon, Russia was continued throughout the 1995. This evaluation was partially sponsored by NOAA as well as by the U.S. and Canadian private companies (BELFORT, SUTRON, ScTI, HS&S, Lakewood Systems).

8.3. A joint study on the creation of unbiased precipitation data set carried out at the NCDC by David R. Easterling, PI, and Pavel Ya. Groisman, CO-PI, (and several other participants in this project from the U.S. and Russian sides) is due in the end of the 1995. The major achievement of the year 1995 is the creation of a digital extended historic metadata set for about 1500 U.S. meteorological stations that can be used for adjustments of precipitation (as well as wind) climatological time series to make them less biased and not affected by spurious changes in station environment not related to the "ground truth" precipitation. These results are also included into the paper Groisman et al. (1995) submitted to the J. Geophys. Res.

8.4. A large-scale efforts were made in Assessment of the influence of climate uncertainty on water management in the Dnipro River Basin. This study (started in spring 1994) will be completed in summer 1995. The research has been performed by joint efforts of Russian (State Hydrological Institute), Ukrainian (Ukrainian Hydrometeorological Service and Institute of Cybernetics of the Ukrainian Academy of Science) and American Scientists (Univ. of Massachusetts) and sponsored by the U.S. private firm (Hydrology Science and Services Corporation). This work contributed to the Assessment of the Impact and Adaptations to Climate Changes in the Second Assessment by the Intergovernmental Panel on Climate Change (IPCC 1995).
8.5. Contributions of several Russian authors who possess a unique knowledge on the climate change variations in hydrological cycle were solicited for the Chapter 3 of Second Assessment of Climate Change by the Intergovernmental Panel of Climate Change (IPCC 1995). Among these authors were Dr. Valentin S. Golubev (State Hydrological Institute) who presented his results on the change of evaporation over the USSR (as a result of this contribution a paper to "Nature" is being prepared by joint efforts of Russian and U.S. scientists (Peterson et al. 1995). Dr. Nina A. Speranskaya (State Hydrological Institute) who presented her findings of the changes of soil moisture over the European part of the USSR using the data of the Russian water balance station network. Dr. Vladimir Yu. Georgievsky and Prof. Igor A. Shikhomanov (State Hydrological Institute) who presented their analyses of anthropogenic and "natural" changes of the Caspian Sea level during the past century. Dr. Anna V. Mescherskaya (Main Geophysical Observatory) who presented her analyses of drought/wet periods over the agricultural regions of the former USSR territory during the past 100 years.

9. Preparation of CD-ROMs

Both sides consider that preparation of CD-ROMs is a good way to provide the various Data to the World’s research community. RIHMI-WDC is able to distribute copies of CD-ROMs among the interested services and institutions within former USSR.

Cyclone data: NOAA's National Climatic Data Center (NCDC) released the first version of the Extratropical Cyclone Tracks CD-ROM, as previously indicated. NCDC is currently quality controlling the U.S. and Russian data.

Surface synoptic data: In cooperation with the All-Russian Research Institute for Hydrometeorological Information (RIHMI), NOAA's NCDC, and DOE's Carbon Dioxide Information Analysis Center (CDIAC) are producing CD-ROMs of the former USSR three- and six-hourly synoptic observations for the period 1936-86.


NOAA's National Climatic Data Center (NCDC) is continuing the preparation of 1961-90 global climate normals for the World Meteorological Organization (WMO). Data from 108 countries (approximately 65% of participating countries) has been collected. Normals data were exchanged between NCDC and RIHMI during 1994.

11. Translated Abstracts of Russian-Language Climate Change Publications

The Carbon Dioxide Information Analysis Center (CDIAC), in collaboration with the Research Institute for Hydrometeorological Information- World Data Center (RIHMI), Obninsk, published and distributed "Selected Translated Abstracts of Russian-Language Climate-Change Publications: II. Clouds" (Ravina and Burtis, 1994), the second volume in the four-part series. CDIAC in collaboration with RIHMI began preparation of "Selected Abstracts of Russian-Language Climate-Change Publications: III. Aerosols," the third volume in the series (August 1995 is an estimated date of completing this work). CDIAC and RIHMI agreed to continue preparation of fourth volume of this series "Selected Abstracts of Russian-Language Climate-Change Publications: IV. General Circulation Models" in 1996.

12. Numeric Data Packages

The Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL), in collaboration with the Research Institute of Hydrometeorological Information - World Data Center (RIHMI), Obninsk, and NOAA/National Climatic Data Center (NCDC), produced two numeric data packages that are currently in draft form with release of the CD-ROMs planned for early 1996. These are NDP-040, "Daily Temperature and Precipitation Data for 223 USSR Stations" (Razuvaev et al., 1993) and NDP-048 "Three-Hourly and Six-Hourly Meteorological Data for 223 USSR Stations" (Razuvaev et al., 1995). These NDPs are high quality data sets with accurate descriptions and documentation of the associated data. This work was supported in part by NOAA's Climate and Global Change Program.
13. Greenhouse Gas Monitoring Data

The Carbon Dioxide Information Analysis Center (CDIAC), in collaboration with the Main Geophysical Observatory (MGO), in St. Petersburg, archived atmospheric carbon dioxide concentration records derived from flask samples collected at five former USSR stations. CDIAC incorporated the monthly carbon dioxide concentration records into CDIAC's "Trends '93: A Compendium of Data on Global Change" (Brounshiein et al., 1994). The individual flask records received from MGO replaced those previously furnished and documented in a CDIAC numeric data package (Brounshiein et al., 1991).

14. Snow and Glacier Data

Both sides had received information on problems of creation Databases with snow and glacier Data. They agreed to prepare a short Document to propose efforts in this direction. One of addresses for this Documents is Snow and Ice Data Center (SNIDC).

15. Metadata Information

RIHMI-WDC forwarded to NASA’s Global Change Master Directory (GCMD) the descriptions of 15 Databases which are contained at RIHMI-WDC. These descriptions are included as new entries to GCMD.

DATA EXCHANGES in 1995:

Forwarded to the U.S. in 1995:

The RIHMI will provide their Upper-Air regional and GTS Data bases to be appended to CARDS Data Base, during 1995.

The RIHMI provided to NOAA/NCDC the station history data for the upper air data.

The RIHMI shipped to the U.S about 550,000 marine meteorological observations (data from Russian ships)

A magnetic tape containing marine aerological observations for all the period (about 100,000 observations) will be shipped to the U.S. during 1995.

The RIHMI provided to the U.S. monthly mean river flow data for rivers of Russia with available data for over 40 years.

The RIHMI provided to NCAR the monthly mean river flow data for the period up to 1985 for 272 observational platforms (2 floppy disks)

The RIHMI provided to NOAA/NCDC the monthly CLIMAT Reports for 190 Russian stations for 1994.

The RIHMI provided to the USA three-hourly data for the period 1977 through 1984 for 100 stations that are in addition to the 223 and correspond to stations with agricultural parameters.

The information about 15 Datasets contained in RIHMI was forwarded to NASA and included to Global Change Master Directory (GCMD).

Forwarded to Russia in 1995:

The U.S. provided a combined data set of U.S. upper air station history information and the Russian regional base station history information to the RIHMI.

The U.S. provided to RIHMI magnetic tape containing sea surface temperature data for 1994 (2*2 degs for monthly and 1*1 degs for weekly data)

The U.S. provided to RIHMI the monthly mean river flow data for the U.S.

A CD-ROM containing the tropical cyclone tracks (U.S. and Russian sources) from NOAA/NCDC was provided to the RIHMI.

A CD-ROM with Snow Data and some meteorological elements for the former USSR was provided to RIHMI from WDC-A (Snow and Ice).

The U.S. Side forwarded to RIHMI-WDC the daily data for increased number of meteorological parameters from 120 U.S. stations for the period 1989-1994.

JOINT PUBLICATIONS:


Alduchov, O.A. & Eskridge, R.E., "Complex Quality Control of Upper Air Variables for CARDS Dataset". In preparation.


CONTRIBUTIONS:


Sixth Annual Climate Assessment 1994, NOAA, NMC-CPC, 1995
PLANS FOR 1996

PROJECT 02.08-14: DATA EXCHANGE MANAGEMENT

U.S. Project Leader: Roy Jenne (UCAR)
Russian Project Leader: Marsel Shaimardanov (RIHMI)

14.1 Upper-Air Data Development

14.1.1. Comprehensive Aerological Reference Data Set (CARDS)

In 1996, U.S. and Russian scientists will continue to build the Comprehensive Aerological Reference Data Set (CARDS). The CARDS will consist of three levels of data: level 1, raw data set without corrections; level 2, quality-controlled data set using the Complex Quality Control (CQC) software; and level 3, data set with some detected biases removed. Dr. Oleg Alduchov (RIHMI) will continue to enhance the CQC software during 1996 in Obninsk, Russia, using in part a computer, EXABYTE Tape Drive and Hard Disk of large volume that were loaned to RIHMI by NOAA's National Climatic Data Center (NCDC) under this agreement. The new version of CQC, which will be produced in 1996, will have several advancements. The new versions of CQC will be implemented without delays to produce new versions of CARDS Database level 2.

Joint efforts will be applied in 1996 to Analyze CARDS Database, to prepare Informational Climatic Products on CARDS Database, with emphasize to Station Monthly Statistics Data Set. Work will also continue to develop cloud models for the goals of cloud data control.

In 1996, the Russian side will forward to the U.S.: (1) The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas. (2) Informational Climatic Products as they are obtained from CARDS Databases (3) Observational upper-air Data for 1991-1995 to be included into CARDS Database (4) Information on Station Histories to be included into new versions of Joint Station History Database.

In 1996, the U.S. side will forward to Russia: (1) The CARDS database versions for 1961-90, as data from additional sources are appended and processed jointly with existing data by the advanced versions of CQC software. (2) The CARDS Database for the period 1991-1995 (3) The CARDS Station History Database versions as they are produced.

Both sides believe that a publication on milestone concepts of CARDS as a Joint Project between NCDC and RIHMI, is desirable. End of 1995 or beginning of 1996 is a recommended time for its preparation. WMO Bulletin is a possible issue for such publication.

14.1.2. Upper-Air Humidity Database Development

Both sides will consider to apply efforts to begin jointly producing Upper-Air Humidity Database for the goals of Atmospheric Water Climatological Change Study. Up to summer of 1996 they will clarify the possible directions of the future work and detect the interested organizations and participants from both sides.

14.1.3. Contributed estimates

Russian specialists will contribute the estimates on Upper-Air temperature changes for the period 1993-1995 in early 1996, to the issue:
Seventh Annual Climate Assessment 1995, NOAA, NMC-CPC, 1996

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Rudolf Reitenbach [RIHMI])

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14.2 Ship Data (COADS)

The Comprehensive Ocean-Atmosphere Data Set (COADS) Release 2 is scheduled to be completed in 1997-98 and will include all Russian observations from the earliest period through the latest available data at the time of the final processing cut-off. The All-Russian Research Institute for Hydrometeorological Information (RIHMI) will provide their possible updates of ship observations, both surface and upper-air, which will be sent to the National Center for Atmospheric Research (NCAR) in Boulder, CO. In return, RIHMI will be provided with COADS Release 1a intermediate updates (both observational and monthly Data) as they are produced, and with COADS Release 2 when completed.

Both sides believe that producing CD-ROMs with COADS Data is highly desirable for joint cooperation. In 1996 both sides will consider possibilities of preparing Data bases with marine solar radiation Data for exchange in future.

(U.S. PI: Joe Elms [NOAA/NCDC], Steve Worley [NCAR], Scott Woodruff [NOAA/Office of Atmospheric Research] and Russian PI: Marsel Shaimardanov [RIHMI])

14.3 River Data

During 1995, there was the exchange of monthly mean river flow data between the All-Russian Research Institute for Hydrometeorological Information (RIHMI) and the U.S. Geological Survey (USGS). The data has long records of flow for about 300 rivers in each country. In 1996 after the work with already exchanged data, both sides will prepare the monthly mean river flow data for the maximally available number of sites and period, to be exchanged bilaterally. The efforts to detect and to remove inhomogeneities in data bases of both sides will be applied. The U.S. and Russian sides also will make efforts to study, detect and remove the distortions resulting from human activities, in river flow data of both sides.

(U.S. PI: Jim Slack [USGS] and Russian PI: Marsel Shaimardanov, Veniamin Semyonov [RIHMI])

14.4 Snow Data

The bilateral cooperation and data exchange between Russia and the U.S. will be developed in 1996 by surface snow data study and exchange. CIRES and WDC-A for Ice and Snow from the U.S. side and Institute of Geography and RIHMI from Russian side are planning a joint work for investigation of snow cover change over the both countries in the last two decades. Snow cover data sets are prepared in both countries and available now for exchange and investigation. For this purpose the U.S. will send to Russia a decadal (ten-days means) snow cover data set for approximately 500 sites on the U.S. area for 1971-1990 and Russia will send to the U.S. the same spatial density data set (not more than 1000 sites on the former USSR territory) for 1971-1990. These data sets will be checked for compatibility and quality in both countries and used for analysis of snow cover change in both countries.

Special attention will be paid for updating for 1984-1990 (and, if possible, to 1994) and improving of the baseline daily snow depth data set for 223 of the fUSSR stations (data set STOS). This data set is an important part of any work for comparison of snow cover change over two countries for long period.

US PI: Roger Barry (CIRES/WDC-A for Ice and Snow) and Russian PI: Alexander Krenke (Institute of Geography of Russian Academy of Science) and Vyacheslav Razinaev (RIHMI-WDC).

14.5 Extra-Tropical Cyclone Tracks

NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) are collaborating in preparing the Extra-Tropical Cyclone Tracks data set. A CD-ROM containing the tracks from the U.S. and Russia are contained as two separate data sets on the CD-ROM. NOAA/NCDC began to investigate the possibility of blending Russian tracks with U.S. produced tracks ending in eastern Europe for the zone over most of Russia. In 1996 both sides, upon availability of funding, will continue to
update their collections to provide maximally possible period of observations included.

(U.S. PI: Mike Changery [NOAA/NCDC], Roy Jenne [NCAR] and Russian PI: Marsel Shaimardanov [RIHMI])

14.6 Inventorying of Foreign Publications

NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI) has had a cooperative project comparing each country's foreign data publications in the hopes of developing a combined inventory of each other's holdings. Sample comparisons have revealed that each center possessed some unique data publications that would be important to the preparation of long-series climate data sets. During 1994, RIHMI prepared copies of all inventory cards of their foreign publications and made them available to NCDC. Future plans for this project will include a comparison of this inventory with NCDC's holdings and begin the preparation of a consolidated inventory. From this inventory, it is planned to identify unique data sources and to develop a plan to digitize that data which will be required to prepare global baseline data sets.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI])

14.7 Update of Exchanged Meteorological Data Sets

Over the last several years, there has been an active data exchange between NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Future exchange activities will include updating those data sets previously exchanged with more current data. During 1996, several activities will take place: (1) the historical monthly mean data sets for humidity, pressure, and sunshine duration for 243 stations will be prepared at RIHMI to include data through 1994; (2) three-hourly and daily meteorological data sets for Russian stations from 233 stations of the former USSR will be updated from 1990 through 1991 and if possible, to 1994; (3) snow data sets (data set STOS) will be updated to 1990 and, if possible, to 1994; (4) CLIMAT message data for 223 stations collected from GTS for 1995 will be prepared by RIHMI during January 1996; (5) the updated to 1993 and improved version of daily mean, minimum and maximum temperature and precipitation data for 223 stations.

The NCDC will update and send to RIHMI: (1) an updated to 1994 versions of the Global Historical Climate Network data set; (2) daily data on an increased number of meteorological parameters for 120 stations for 1995; (3) three-hourly synoptic observations for the Worldnet stations for the period 1988-1994.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI])

14.8 Preparation of Bias-Free Data Sets

During 1996, the work on developing bias-free data sets will continue at NOAA's National Climatic Data Center (NCDC) and the All-Russian Research Institute for Hydrometeorological Information (RIHMI). Special attention will be given to improving daily minimum, maximum, and mean temperature data sets. These data are intended to be the baseline sets for the study of changes in diurnal temperature range and asymmetric changes of minimum and maximum temperature during the last four or five decades. Both NOAA/NCDC and RIHMI scientists will continue work on the basis of these data sets.

(U.S. PI: Thomas Karl [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI])

14.9 Global Water Cycle

14.9.1 Empirical approach of studying the snow cover feedback.

This approach was expanded for the cloud feedback problem and to the problem of turbulent heat fluxes evaluation (and their changes with snow on the ground and/or cloud cover variations). This work is being continued at the University of Massachusetts by Dr. Pavel Ya. Groisman (formerly with the State Hydrological Institute) and Prof. Raymond S. Bradley, at NOAA's National Climatic Data Center (Dr. Thomas R. Karl), at
the State Hydrological Institute (Dr. Kirill I. Selyakov), and at the Main Geophysical Observatory (Dr. Eugene L. Genikhovich). First publications and conference papers were submitted/delivered on this topic. These studies are well under way and future progress is anticipated in 1996.

14.9.2. The evaluation of accuracy of rain gauges.

The evaluation of the accuracy of several U.S. rain gauges at the Valdai precipitation polygon, Russia was continued throughout the 1995. In the 1996 it is expected to prepare a Report and two publications on the results of this evaluation.

14.9.3. Creation of unbiased precipitation data set.

A joint study on the creation of unbiased precipitation data set carried out at the NCDC by David R. Easterling, PI, and Pavel Ya. Groisman, CO-PI, (and several other participants in this project from the U.S. and Russian sides) is due in the end of the 1995. The major achievement of the year 1995 is the creation of a digital extended historic metadata set for about 1500 U.S. meteorological stations that can be used for adjustments of precipitation (as well as wind) climatological time series to make them less biased and not affected by spurious changes in station environment not related to the "ground truth" precipitation. Further studies of solid precipitation, snow cover, and snow pack over North America are planned for 1996 (if they will be funded).

14.9.4. Influence of climate uncertainty on water management.

A large-scale efforts were made in Assessment of the influence of climate uncertainty on water management in the Dnipro River Basin. This study (started in spring 1994) will be completed in this summer. The research has been performed by joint efforts of Russian (State Hydrological Institute), Ukrainian (Ukrainian Hydrometeorological Service and Institute of Cybernetics of the Ukrainian Academy of Science) and American Scientists (Univ. of Massachusetts) and sponsored by the U.S. private firm (Hydrology Science and Services Corporation). This work contributed to the Assessment of the Impact and Adaptations to Climate Changes in the Second Assessment by the Intergovernmental Panel on Climate Change (IPCC 1995). At the end of 1995 and in 1996 this study will continue. A series of publications will emerge from this study.

(U.S. PI: Thomas R. Karl [NOAA/NCDC] and Russian PI: TO BE DETERMINED)

14.10 Preparation of CD-ROMs

NOAA's National Climatic Data Center (NCDC), in conjunction with the Carbon Dioxide Information Analysis Center (CDIAC) in Oak Ridge, Tennessee, is producing a CD-ROM of the regional three-and six-hourly synoptic observations for the period 1936-86. CDIAC in cooperation with RIHMI is preparing the data for the disk, and will issue a CD-ROM of the data in 1996. NCDC in cooperation with RIHMI will also utilize these data and available regional daily data in preparing climate summaries for the set of regional sites. These summaries will be included on the Version 4 of the International Station Meteorological Climate Summary (ISMCS) CD-ROM scheduled to be released in spring of 1996. Credit will be given on the disk to the RIHMI for the data. Copies of the CD-ROM will be available to scientists from both countries.

(U.S. PI: August Shumbera [NOAA/NCDC] and Russian PI: Vyacheslav Razuaev [RIHMI])

14.11 Creation of 1961-90 Global Normals

NOAA's National Climatic Data Center (NCDC) will continue the preparation of the 1961-90 global climate normals for the World Meteorological Organization (WMO). Data from the All-Russian Research Institute for Hydrometeorological Information (RIHMI) were provided to NCDC in 1993. All data for the world will be put in a common format and quality controlled, and the published data will be available to both sides.

(U.S. PI: Kenneth Hadeen [NOAA/NCDC] and Russian PI: Vyacheslav Razuaev [RIHMI])
14.12 Translated Abstracts of Russian-Language Climate-Change Publications

In cooperation with the All-Russian Research Institute for Hydrometeorological Information (RIHMI), and the International Science Foundation, the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) proposes to continue work on the four-part series entitled: "Selected Translated Abstracts of Russian-Language Climate-Change Publications," by completing volume IV ("General Circulation Models"). In support of this project, CDIAC would continue the loan to RIHMI of a personal computer system, including translation and Russian word processing software. CDIAC proposes, as part of this project, additional reciprocal visits between Obninsk and Oak Ridge National Laboratory as budgets permit.

(U.S. PI: Robert Cushman [ORNL/CDIAC] and Russian PI: Rudolf Reitenbach [RIHMI])

14.13 Numeric Data Packages (NDPs)

In cooperation with the All-Russian Research Institute of Hydrometeorological Information (RIHMI) - World Data Center, Obninsk, and NOAA's National Climatic Data Center (NCDC), the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) proposes to produce additional numeric data packages (NDPs) based on expanded versions of the 223-station Russian climate data sets.

(U.S. PI: Thomas Boden [ORNL], Peter Steurer [NOAA/NCDC] and Russian PI: Vyacheslav Razuvaev [RIHMI])

14.14 Greenhouse-Gas Monitoring Data

In cooperation with the Main Geophysical Observatory, St. Petersburg, and the Institute of Global Climate and Ecology (IGCE), Moscow, the Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) proposes to receive additional greenhouse-gas monitoring data from Russian stations for eventual publication as CDIAC numeric data packages and in CDIAC's "Trends '95: A Compendium of Data on Global Change." CDIAC proposes, as part of this project, reciprocal visits between Oak Ridge, Moscow, and St. Petersburg as budgets permit.

(U.S. PI: Thomas Boden [ORNL] and Russian PI: Alexander Shashkov [MGO], Felix Rovinsky, Vladimir Egorov [IGCE])

14.15 Satellite Data Management

During Data Coordinators Meeting in July 1995, while visiting Institute of Space Research (IKI) and NPO PLANETA, both sides studied the situation with Data from Meteorological Satellites and their use for Climate Change study in future. NPO PLANETA will prepare for the U.S. side the inventory of Data from Russian satellites which are under their responsibility. U.S. side will prepare the inventory of satellite data products which may be considered for joint study of Climate Change in future.

In 1996, activity is proposed in the field of Satellite Data Management, which is useful for both sides. For example, the Russian side is interested, in the interests of future joint research, to obtain the Data on Radiation Balance (ERBE data, NIMBUS-7, ISCCP Data), the MSU Channel 4 and 2 Data to define temperatures of troposphere and lower stratosphere, and, upon availability, some other satellite Data.

(U.S. PI: August Shumbera (NCDC-WDCA), and Russian PI: Rudolf Reitenbach (RIHMI-WDC))

14.16 Development of Telecommunications

Both sides believe that access of RIHMI-WDC to INTERNET facilities is extremely useful for bilateral cooperation and for advanced Data exchange activity. The use of INTERNET NODE at Institute of Space Research (IKI) is a good possibility to solve the problem to connect RIHMI to INTERNET. Russian Side will find the opportunity to provide the communications channels between Obninsk (RIHMI-WDC) and Moscow (IKI). Both sides find it
reasonable to prepare papers to be forwarded to NASA in order to request proper equipment for these goals, in accordance with the existing NASA Program of Telecommunications Development.

(U.S. PI: Roy Jenne (UCAR) and Russian PI: Marsel Shaimardanov (RIHMI-WDC))

14.17 Data Coordinator’s Meeting

The next meeting of the data coordinators will be held at USA in July-October 1996. Up to three (3) or four (4) Russian specialists will be invited for up to seven (7) days.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])

14.18 Additional Exchange of Scientists

Up to three specialists from Russia may participate at 20 Annual Climate Diagnostics Workshop in Seattle, WA, in October 1995. This meeting will be used for discussing the status of preparation baseline data sets for climate research.

Up to five specialists from Russia will participate the 21 Annual Climate Diagnostics Workshop in U.S. in late 1996.

Pending the availability of funds, additional reciprocal visits of Russian and U.S. specialists will be considered for participation in international and bilateral meetings in support of the activities conducted within the framework of Project 14.

(U.S. PI: Roy Jenne [National Center for Atmospheric Research] and Russian PI: Marsel Shaimardanov [All-Russian Research Institute for Hydrometeorological Information])

SUMMARY OF 1996 DATA EXCHANGES

From the U.S. to Russia:

(1) The CARDS database versions for 1961-90, as data from additional sources are appended and processed jointly with existing data by the current and advanced versions of CQC software, will be forwarded to RIHMI.

(2) The CARDS Database for the period 1991-1995 will be forwarded to RIHMI

(3) The CARDS Station History Database versions as they are produced, will be forwarded to RIHMI.

(4) The NCDC will update and send to RIHMI on a regular basis the annual additions to the Global Historical Climate Network data set.

(5) The U.S. side will send to RIHMI the updatings to COADS Release la observational and statistics Data

(6) NOAA/NCDC will send to RIHMI three-hourly synoptic observations data set for the Worldnet stations for the period 1988-1995.

(7) The U.S. side will send to RIHMI the monthly mean river flow data for the period 1986 - 1990

(8) NCDC will send to RIHMI the snow cover data set for approximately 500 sites on the U.S. area for 1971-1990.

From Russia to the U.S.:

(1) The observational upper-air data for any miscellaneous stations as might be needed to fill in data-sparse areas.
(2) Upper-Air Informational Climatic Products, as they are obtained from CARDS Databases

(3) Observational upper-air Data for 1991-1995 to be included into CARDS Database

(4) Information on Station Histories to be included into new versions of Joint Station History Database

(5) The RIHMI will send to NCDC the historical monthly mean data sets for humidity, pressure, and sunshine duration for selected 243 stations up to 1994.

(6) Three-hourly and daily meteorological data sets for 223 stations will be updated from 1990 through 1991 for Russian stations and others, if possible, and sent to NCDC.

(7) Snow data sets (Data set STOS) will be updated to 1990 and sent to NCDC (for SNIDC).

(8) CLIMAT messages for 1995 for 243 stations will be sent to NCDC in January 1996.

(9) RIHMI will prepare monthly mean river flow data for the period 1986-90 and will forward them to the U.S.

(10) RIHMI will send to NCDC and WDC-A (USA) the ten-days means snow cover data set for hot more than 1000 sites on the former USSR area for 1971-1990.

(11) RIHMI will send to NCDC updated to 1993 and improved version of daily mean, max. and min. temperature and precipitation data for 223 stations.

(12) RIHMI will prepare updates to marine surface meteorological and marine upper-air data and will send them to the U.S. side.

FROM THE U.S. SIDE:

Roy L. JENNE
Dr. Roy L. JENNE,
UCAR
Project 02.08-14 Leader from U.S.Side

FROM THE RUSSIAN SIDE:

Mile
Dr. Marsel SHAIMARDANOV,
RIHMI-WDC
Project 02.08-14 Leader from Russian side
PROTOCOL

1994 US/Russia Data Exchange Coordinators Meeting
under Working Group VIII of the Joint US-Russian Committee on
Cooperation in the Field of Protection of the Environment and Natural
Resources

7-8 November 1994
Asheville, North Carolina
USA

The US-Russia Data Exchange Coordinators meeting was held at the
National Climatic Data Center/World Data Center A for
Meteorology, Asheville, North Carolina during the period 7-8
November 1994.

The list of participants is attached (Appendix A).

The both sides believe that Project 02.08-14, 1995 Protocol of
WG-VIII meeting (The Influence of Environmental Changes on
Climate) can be the basis for Data Exchange Activity for 1994–
1995.

A Supplementary text with additional data activities was prepared
and mutually signed. (Appendix B)

The both sides agree on:

Collection of data at WDC-A and WDC-B. In both the US and
Russia, there are several national agencies that collect
hydrometeorological data. Both the US and Russia sides are
supporting the idea that all of the hydrometeorological data in
their countries should be concentrated at WDC's and that the
WDC's should then exchange data using the bilateral data
exchange.

Preparation of joint publications for the data exchange. Both sides
have expressed the desire to prepare joint publications that
describe the history and status and prospects of the
hydrometeorological data exchange and updates between the US and
Russia.
The Loan Agreement on magnetic tapes to Russia was signed (Appendix C). The Russian side expresses gratitude for the kind hospitality which is received during its visit to Asheville.

From the U.S. Side:

[Signature]

Dr. Roy Jenne, NCAR
WG-VIII for Data Exchange
Co-Chairman

[Signature]

August L. Shumbera, Jr.
Director
World Data Center A

From the Russia Side:

[Signature]

Dr. Marsel Shaimardanov
Director
Russian Institute for
Hydro-meteorological
Information
World Data Center B

WG-VIII for Data Exchange
Co-Chairman
List of Participants

From US Side:

Roy Jenne
NCAR

August L. Shumbera, Jr.
NCDC/NOAA
WDCA Director

Richard M. Davis
NCDC/NOAA

Peter Steurer
NCDC/NOAA

From Russia Side:

Marsel Z. Shaimardanov
RIHMI-WDCB, Director

Alexander M. Sterin
RIHMI-WDCB
Meeting of Data Exchange Coordinators  
(for the U.S./Russia WG-VIII Exchange Meetings)  
7-8 November 1994, Asheville, NC

This is a supplemental text to the data exchanges described in the 1995 Protocol of WG-VIII dated September 1994.

1. U/A Station History Information and Schedule for Sending CARDS Data (14.1)

The Central Aerological Observatory (CAO, Moscow) had prepared the information on changes for radiosonde temperature correction techniques valid for U/A data homogeneities study. On the US side, Dianne Gaffen (NOAA-ARL), Stephen Doty (NCDC) and others have been very helpful in preparing station information.

The CQC'd CARDS data for 1986-90 were sent from WDC-A to WDC-B in September 1994. The CQC'd CARDS data for 1961-90 will be sent in late 1995.

2. Surface Ship Data Exchanges (COADS, 14.2)

The cutoff time for receiving ship data for reanalysis for 1992-94, if available, is about early January 1995. The cutoff time for release II of COADS is about November 1966. R. Jenne (NCAR) will obtain a better time estimate and send a message to RIHMI.

The world changed the method to exchange world ship data, starting with data for January 1994. The new method is not yet working well. A copy of the global data needs to flow to WDC-A so that the U.S. can update the COADS data set. WDC-B will do all that they can to coordinate the exchange between centers in Europe.

   - Ship Upper Air Data

Both sides are interested in an exchange of U/A data from moving platforms such as moving ships. WDC-B sent the collection of Russian ship U/A data to the US (to NCAR).

NCDC will send the US collection of OSV ship upper air data, approximately November 1994.

3. River Data (14.3)

A list of river stations for exchange was prepared in past years. Each side has prepared long records of monthly data from about 250 to 450 rivers for exchange. The data will be exchanged about
January-February 1995. Each side will study the data, the techniques of their preparation and control. At a later time, it may be desirable to have a meeting of technical experts.

4. Extra-Tropical Cyclone Tracks (14.4)

Russia will supply data through 1991. NCDC will prepare a CD-ROM that has the storm tracks by NCDC, by RIHMI and NCDC will explore the possibility of also including a merged set.

5. Inventories of Foreign Publications (14.5)

No change.

6. Update of Exchanged Meteorological Data sets (14.6)

No change.

7. Bias-Free Data Sets (14.7).

No change.


The PI from the Russian side is Groisman (at SMI)


No change.


NCDC estimates that the data can be released by WMO about January 1996.


No change.

12. Numeric Data Package (NDPs) (14.12)

The draft text of NDP-048, which describes 3-hour meteorological data, is under preparation at CDIAC.


No Change.
14. Data Coordinators Meeting (14.14)

The next meeting will be held before September 1995 so that there is time to include the information in the annual meeting of WG-VIII, usually held in September or October. Current plans are to hold the meeting sometime between May and July 1995 in Obninsk.

15. Vegetation Index Data

Two tapes of vegetation index data (for 3 months, a special request) were sent to WDC-B in the summer of 1994.


The US Climate Analysis Center prepares daily station summary data for about 7,500 global stations, based on 3-hourly data on GTS. NCDC prepared the data for temperature and precipitation, for 1977-91 onto a CD-ROM (Version 1.0, March 1994). A copy of this CD-ROM was given to WDC-B in November 1994.

17. Daily Snow Data.

The National Snow and Ice Data Center (NSIDC, USA) has obtained data for daily snow depth (not water equivalent) for 280 regional stations. Some of the data is from 1900 and the record extends to 1983.

The list of stations is similar to the daily temperature and precipitation list of 223 stations, but another set of 50 stations were added. The data was prepared by the geography groups in Moscow using books from WDC-B.

NSIDC planned to prepare a CD-ROM of the snow depth by September 1994. NCAR will send two copies to WDC-B and two to WDC-A.

18. A Computer and Exabyte Tape Drive for CARDS

A computer and tape drive were provided to WDC-B in September 1994 (on loan) to work on the CARDS data project.

Because of hard disk space problems, a larger external disk would help. The U.S. side will consider loaning a larger disk drive and an external SCSI card.

19. Blank 6250 tapes for WDC-B.

NCAR is prepared to send 500 blank tapes to WDC-B. NCDC will consider sending up to 2,000 tapes. The two sides prepared a joint statement about the loan of the tapes.
BI-LATERAL LOAN AGREEMENT
FOR
MAGNETIC TAPES

NOVEMBER 10, 1994

As part of the "U.S.-Russian Agreement on Cooperation in the Field of Protection of the Environment and Natural Resources"; Working Group VIII - "The Influence of Environmental Changes on Climate", the U.S. agrees to provide, on loan, 500 blank 6250 bpi magnetic tapes for RIHMI use in scientific research. The tapes will be shipped from the National Center for Atmospheric Research (NCAR) and/or from the National Climatic Data Center (NCDC) WDC-A to RIHMI WDC-B.

August L. Shumbera
Director, WDC-A
Meteorology
(U.S. Side)

Roy Jenne, NCAR, Boulder, CO
Chairman, Working Group VIII for Data Exchange
(U.S. Side)

Dr. Marsel Shaimardanov
Russian Institute for Hydro-Meteorological Information-World Data Center
(Russian Side)

Appendix C
US - Russia Data Exchange

Items for discussion:
1. Exchange of monthly river data
2. Status of ship UA exchange
3. Status of surface marine:
   - Russia has COADS (1980-92)
   - US requests ship update
4. Snow data
5. UA data for N. Pole Stations
   - Russian stations
   - Ice island T3
6. Status UA data exchange
7. Exchange of daily data
   - CD-Rom of C&I daily (1979 - on)
8. Discussion of monthly precipitation
   - Does Russia want copy of DOE tape?
9. Blank tapes NCAR to Russia
10. Status of funding for data activities, US and Russia
11. Meeting of coordinators in 1995 (what month)

--- Soil moisture, reanalysis

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