These handouts have information about datasets and data issues. A global view is given, but there is an emphasis on the polar regions.

1. Handout No. 1 (21 pages)
   This handout is mostly for main experts on satellite data and science.
   Emphasis on sounders for early years, about 1969-74.

2. Handout No. 2 (16 pages)
   - Data for raob stations N. of 60° N. (timelines).
   - Old daily grid analyses (for comparisons with new reanalyses or for use as bogus points).
   - The Document Project
     - Where to find information re datasets, science, etc.
     - Now 390 documents (online)
     - Over 22,300 pages
     - Lists of documents for upper air data, surface land observations, etc.

3. Handout No. 3 (28 pages)
   - Some reanalysis tasks to consider (4 p).
   - Options for more data for S. Hemisphere (1 p).
   - Two big projects to prepare obs data (reanalysis obs, CARDS, IGRA, and more) (3 p).
   - Temp curve from NCEP/NCAR reanalysis (1948-2003).
   - Information on old weather data and history.
   - Changes in glaciers, 6000 years.

This is Document RJ0392, ready Apr 24, 2006, 67 pages
Handouts for Reanalysis

1. Develop better satellite cloud winds

2. Info on early satellite sounders
   • Includes comments about noisy channels

Roy Tenne
NCAR
April 3, 2006

Note: This handout is mostly for the main experts on satellite data and science.
Develop Better Satellite Cloud Winds
(for Use in Reanalysis)

- U of Wisc wants to calculate new GOES winds, 1978 – 87
- Also try to get more winds for US sector for 1967 – 73.
- Cloud winds have the potential to help the analyses a lot.

a. Calculate these winds from geosynchronous satellite data.


c. USA: The US should calculate new winds for 1978 – 89.
   - I have talked about this with U. Wisc.
   - Jan, Feb 2000: U. Wisc has made a proposal.

d. Status in Feb 2000
   - Europe is about 60% done (estimated).
   - USA hasn’t started (to do GOES data).
   - NCAR will help encourage the work.
     - U. Wisc almost got some funds in Mar 2000, but didn’t.
     - Update: Aug 2001: This project has not yet been funded.

e. Status of University of Wisconsin work, Oct 2000
   - NOAA may find a way to get some funds to U. Wisc.

f. I need a better status of the European work.

from RJ0183

Roy Jenne
Oct 2000
Cloud Wind Data from ATS

- NCEP data tape 1967 – 1972
  - The wind counts are very low.

- ATS 10 x 10 inch pictures are for years
  01/1967 – 08/1974
  - And they could make film loops.

- Another archive?
  - Was there an archive of more winds?
  - Could we make winds from the pictures?

From RJ0183

Roy Jenne
Aug 1999
Figure 5. The number of aircraft and satwind observations used for the original operational analyses at NCEP are given. Since 1986 the number of aircraft reports has increased to 14,420 in 1998, not counting aircar data. Also the number of satwind reports increased to 18,368 per day in 1998.
## Table 1: TEN-DAY COUNTS OF CLOUD WINDS, 1973-1998 (NCEP real-time topics)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>1.6</td>
<td>2.6</td>
<td>2.6</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>1.6</td>
<td>1.3</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>1.4</td>
<td>2.6</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>1.3</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>1.5</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>1.3</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>1.2</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>1.3</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1.1</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>1.0</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>1.3</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>1.2</td>
<td>2.8</td>
<td>2.5</td>
<td>1.2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** A US oil well was over India for FGGTE, the data in this panel likely is used for CONUS.
Satellite Data at SSEC, University of Wisconsin

- SSEC has GOES digital data for 1978–on
- Earlier picture data starts Jan 1967
- Data volume was 287 TBytes in Aug 2001
- They have data from other FGGE satellites
- There are 7 main items and 79 pages here

Ready to scan Apr 1, 2002, Doc RJ0183, 79p

Roy Jenne
Mar 2002
The University of Wisconsin Wants to Make New Cloud Winds

Roy Jenne
3 Mar 2000

608-265-4741

On 29 Feb 2000, I talked with Denise Laitsch from University of Wisconsin. They are very interested in helping reanalysis projects by calculating new cloud winds that remove the old problem of a slow speed bias. They have prepared an open proposal:

a. It would take about $200k to set up and test programs to make the calculations in an environment for fast production. This would take 2 or 3 months to accomplish.

b. To calculate winds 4x/day they would need about $50k per satellite year. They think that they could do about 10 satellite years in one calendar year.

c. ECMWF will start reanalysis production on these years about Jan 2001. The NCEP mesoscale reanalysis will start about 04/2001. The U of Wisc group could do a number of the most critical years before then, say 1980 – 85, if funding could start soon. Note that the later years of data will be needed somewhat later than early years.

d. With lesser funding amounts, they are still interested in carrying the project as far as they can.

*This work was not funded:* - R Jenne Mar 2006

Note: I was able to contact Denise again in March 2006. She is still on campus, but working on a very different job.

Roy Jenne, NCEP
March 2006
<table>
<thead>
<tr>
<th>WHAT</th>
<th>Media</th>
<th>Units</th>
<th>Data Period</th>
<th>GBs Archived</th>
<th>TBs Archived</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS-1</td>
<td>(464)</td>
<td></td>
<td>74178 - 74271, 79027 - 79109</td>
<td>(1,858)</td>
<td></td>
</tr>
<tr>
<td>SMS-2</td>
<td>(3,633)</td>
<td></td>
<td>79110-81217</td>
<td>(10,354)</td>
<td></td>
</tr>
<tr>
<td>GOES-1</td>
<td>(2,054)</td>
<td></td>
<td>78336-79335, 82333-83151, 84243-85034</td>
<td>(7,530)</td>
<td></td>
</tr>
<tr>
<td>GOES-2</td>
<td>(1,329)</td>
<td></td>
<td>78049-79026</td>
<td>(3,788)</td>
<td></td>
</tr>
<tr>
<td>GOES-3</td>
<td>(3,283)</td>
<td></td>
<td>78324-81063</td>
<td>(9,357)</td>
<td></td>
</tr>
<tr>
<td>GOES-4</td>
<td>(1,699)</td>
<td></td>
<td>81064-82329</td>
<td>(8,246)</td>
<td></td>
</tr>
<tr>
<td>GOES-5</td>
<td>(2,527)</td>
<td></td>
<td>81218-84211</td>
<td>(12,666)</td>
<td></td>
</tr>
<tr>
<td>GOES-6</td>
<td>(2,466)</td>
<td></td>
<td>83152-87084</td>
<td>(16,892)</td>
<td></td>
</tr>
<tr>
<td>GOES-7</td>
<td>(85)</td>
<td></td>
<td>87084-87124</td>
<td>(582)</td>
<td></td>
</tr>
<tr>
<td>GOES-4</td>
<td>(68)</td>
<td></td>
<td>80266-81063</td>
<td>(194)</td>
<td></td>
</tr>
<tr>
<td>GOES-5</td>
<td>(703)</td>
<td></td>
<td>81218-84211</td>
<td>(4,784)</td>
<td></td>
</tr>
<tr>
<td>GOES-6</td>
<td>(1,362)</td>
<td></td>
<td>83338-84049, 84339-87083</td>
<td>(9,330)</td>
<td></td>
</tr>
<tr>
<td>GOES VAS Interrupt</td>
<td>U-matic</td>
<td>1,170</td>
<td>1983</td>
<td>8,015</td>
<td>7.8</td>
</tr>
<tr>
<td>GOES-5</td>
<td>(742)</td>
<td></td>
<td></td>
<td>(5,083)</td>
<td></td>
</tr>
<tr>
<td>GOES-6</td>
<td>(428)</td>
<td></td>
<td></td>
<td>(2,932)</td>
<td></td>
</tr>
<tr>
<td>GOES Mode-AAA</td>
<td>U-matic</td>
<td>10,871</td>
<td>1987-1996</td>
<td>74,466</td>
<td>72.7</td>
</tr>
<tr>
<td>GOES-6</td>
<td>(1,370)</td>
<td></td>
<td>87084-89020</td>
<td>(9,385)</td>
<td></td>
</tr>
<tr>
<td>GOES-7</td>
<td>(9,501)</td>
<td></td>
<td>87124-96011</td>
<td>(65,082)</td>
<td></td>
</tr>
<tr>
<td>METEOSAT 75W (ADC)</td>
<td>U-matic</td>
<td>881</td>
<td>93001-95152</td>
<td>881</td>
<td>.9</td>
</tr>
<tr>
<td>GOES GVAR (as of 9/30/97)</td>
<td>U-matic</td>
<td>5,655</td>
<td>1994-1997</td>
<td>50,895</td>
<td>49.7</td>
</tr>
</tbody>
</table>
### Category 6. Radiometer (misc.)

<table>
<thead>
<tr>
<th>S/C</th>
<th>NSDC-ID</th>
<th>Cat</th>
<th>Data Set Name</th>
<th>Trk Density #Tp</th>
<th>Bkup #Tp</th>
<th>6250</th>
<th>Time Span</th>
<th>Tp 1st Rqst #Tp</th>
<th>Rqst #Tp</th>
<th>List Rate</th>
<th>Rec'd 82-87 Total</th>
<th>Req Avg</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIMBUS 1</td>
<td>64-052A-03A</td>
<td>R1</td>
<td>(HRIR) Met Radiation Tapes</td>
<td>7 800</td>
<td>238</td>
<td>231</td>
<td>30 640829-640922</td>
<td>700615</td>
<td>0</td>
<td>1</td>
<td>1973</td>
<td>5</td>
<td>FRC still locating</td>
</tr>
<tr>
<td>NIMBUS 2</td>
<td>66-040A-03A</td>
<td>R1</td>
<td>(HRIR) Met Radiation Tapes</td>
<td>7 800</td>
<td>1739</td>
<td>1734</td>
<td>223 660515-661115</td>
<td>700131</td>
<td>0</td>
<td>1</td>
<td>1977</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>NIMBUS 3</td>
<td>66-040A-04A</td>
<td>R1</td>
<td>(HRIR) Met Radiation Tapes</td>
<td>7 600</td>
<td>98</td>
<td>102</td>
<td>13 660515-660728</td>
<td>690800</td>
<td>0</td>
<td>4</td>
<td>1975</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>NIMBUS 3</td>
<td>67-017A-02C</td>
<td>R1</td>
<td>(HRIR) Met Radiation Tapes</td>
<td>7 800</td>
<td>1015</td>
<td>986</td>
<td>130 690417-700321</td>
<td>680700</td>
<td>0</td>
<td>50</td>
<td>1976</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>NIMBUS 3</td>
<td>69-017A-05B</td>
<td>R1</td>
<td>(HRIR) Met Radiation Tapes</td>
<td>7 800</td>
<td>390</td>
<td>390</td>
<td>50 690415-700204</td>
<td>710200</td>
<td>0</td>
<td>35</td>
<td>1977</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>TIROS 2</td>
<td>60-016A-02A</td>
<td>R2</td>
<td>(SR) Met Radiation Tapes</td>
<td>7 200</td>
<td>126</td>
<td>126</td>
<td>4 601123-601413</td>
<td>680000</td>
<td>0</td>
<td>0</td>
<td>1975</td>
<td>3</td>
<td>- 5 km pixel</td>
</tr>
<tr>
<td>TIROS 3</td>
<td>61-017A-01A</td>
<td>R2</td>
<td>Omnidirectional Radiometer Tapes</td>
<td>7 556</td>
<td>5</td>
<td>5</td>
<td>0 610712-611022</td>
<td>670000</td>
<td>0</td>
<td>0</td>
<td>1986</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TIROS 3</td>
<td>61-017A-03A</td>
<td>R2</td>
<td>Omnidirectional Radiometer Tapes</td>
<td>7 200</td>
<td>74</td>
<td>74</td>
<td>2 610712-611001</td>
<td>680900</td>
<td>1</td>
<td>3</td>
<td>1986</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TIROS 4</td>
<td>62-002A-01A</td>
<td>R2</td>
<td>Omnidirectional Radiometer Tapes</td>
<td>7 556</td>
<td>10</td>
<td>10</td>
<td>1 620208-620528</td>
<td>670700</td>
<td>0</td>
<td>0</td>
<td>1984</td>
<td>3</td>
<td>0 Hist Only</td>
</tr>
<tr>
<td>TIROS 4</td>
<td>62-002A-01B</td>
<td>R2</td>
<td>Omnidirectional Radiometer Tapes</td>
<td>7 556</td>
<td>2</td>
<td>2</td>
<td>0 620208-620510</td>
<td>670700</td>
<td>0</td>
<td>0</td>
<td>1983</td>
<td>3</td>
<td>0 Hist only</td>
</tr>
<tr>
<td>TIROS 4</td>
<td>62-002A-01A</td>
<td>R2</td>
<td>Omnidirectional Radiometer Tapes</td>
<td>7 556</td>
<td>9</td>
<td>9</td>
<td>1 630619-630829</td>
<td>670700</td>
<td>0</td>
<td>1</td>
<td>1973</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TIROS 5</td>
<td>63-024A-01A</td>
<td>R2</td>
<td>Omnidirectional Radiometer Tapes</td>
<td>7 200</td>
<td>609</td>
<td>607</td>
<td>22 630519-630619</td>
<td>690200</td>
<td>1</td>
<td>10</td>
<td>1982</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

### Category 7. Sounder

<table>
<thead>
<tr>
<th>S/C</th>
<th>NSDC-ID</th>
<th>Cat</th>
<th>Data Set Name</th>
<th>Trk Density #Tp</th>
<th>Bkup #Tp</th>
<th>6250</th>
<th>Time Span</th>
<th>Tp 1st Rqst #Tp</th>
<th>Rqst #Tp</th>
<th>List Rate</th>
<th>Rec'd 82-87 Total</th>
<th>Req Avg</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIMBUS 3</td>
<td>69-017A-03A</td>
<td>S1</td>
<td>(IRIS) Radiance Tapes</td>
<td>9 1600</td>
<td>102</td>
<td>-1</td>
<td>26 690415-690701</td>
<td>690900</td>
<td>1</td>
<td>17</td>
<td>1987</td>
<td>3</td>
<td>Never at NSDC</td>
</tr>
<tr>
<td>NIMBUS 3</td>
<td>69-017A-04A</td>
<td>S1</td>
<td>(IRIS) Radiance Tapes</td>
<td>7 556</td>
<td>60</td>
<td>61</td>
<td>5 690414-700619</td>
<td>690900</td>
<td>0</td>
<td>12</td>
<td>1973</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>NIMBUS 4</td>
<td>70-025A-03A</td>
<td>S1</td>
<td>(IRIS) Radiance Tapes</td>
<td>9 1600</td>
<td>228</td>
<td>24</td>
<td>58 700409-710130</td>
<td>720403</td>
<td>0</td>
<td>12</td>
<td>1987</td>
<td>7</td>
<td>10 Scotch tapes</td>
</tr>
<tr>
<td>NIMBUS 4</td>
<td>70-025A-04A</td>
<td>S1</td>
<td>(IRIS) Radiance Tapes</td>
<td>7 556</td>
<td>20</td>
<td>20</td>
<td>2 700408-710408</td>
<td>725300</td>
<td>0</td>
<td>11</td>
<td>1975</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>NIMBUS 4</td>
<td>70-025A-10A</td>
<td>S1</td>
<td>(SCR) Radiance Tapes</td>
<td>7 800</td>
<td>51</td>
<td>49</td>
<td>7 700727-730130</td>
<td>750314</td>
<td>2</td>
<td>6</td>
<td>1984</td>
<td>7</td>
<td>CAR</td>
</tr>
<tr>
<td>NIMBUS 5</td>
<td>72-057A-01A</td>
<td>S1</td>
<td>(IFR) IR Radiance Tapes</td>
<td>9 1600</td>
<td>1</td>
<td>1</td>
<td>0 750214-760930</td>
<td>750265</td>
<td>1</td>
<td>1</td>
<td>1982</td>
<td>5</td>
<td>More data? noisy?</td>
</tr>
<tr>
<td>NIMBUS 5</td>
<td>72-057A-02A</td>
<td>S1</td>
<td>(SCR) Radiance Tapes</td>
<td>7 800</td>
<td>70</td>
<td>86</td>
<td>7 721213-741326</td>
<td>770315</td>
<td>1</td>
<td>4</td>
<td>1984</td>
<td>5</td>
<td>Also at NCAR &amp; UK</td>
</tr>
<tr>
<td>NIMBUS 6</td>
<td>75-052A-02B</td>
<td>S1</td>
<td>(HIRS) GARP Data Sys Test Data</td>
<td>9 1600</td>
<td>269</td>
<td>0</td>
<td>69 750817-760304</td>
<td>830228</td>
<td>1</td>
<td>1</td>
<td>1986</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>NIMBUS 6</td>
<td>75-052A-10A</td>
<td>S1</td>
<td>(SACR3) Output Tapes</td>
<td>9 1600</td>
<td>87</td>
<td>102</td>
<td>22 750615-760529</td>
<td>770223</td>
<td>1</td>
<td>19</td>
<td>1985</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>NIMBUS 6</td>
<td>75-052A-10C</td>
<td>S1</td>
<td>(SACR3) GARP Data Sys Test Data</td>
<td>9 1600</td>
<td>269</td>
<td>0</td>
<td>69 750817-760304</td>
<td>830228</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8 Same tapes as N-6 HIRS</td>
<td></td>
</tr>
</tbody>
</table>

Namaste is 5 chan atms sounder. doesn't have HIRS, and is for a longer period. It has first moments, with 22 GHz, gets good H2O vapor.

From Doc RJ 0084 Saunders Jan 2001, on-line at NCAR.

---

Roy Jannes
NCAR
Aug 94
Availablility of Selective Chopper Radiometer Data on Magnetic Tape

25 January 1976

Nimbus 4 data will be available for the period 208/1970 to 307/1972
(day number is 1 on January 1, 365 on December 31, etc.). Alternate
days are missing after 248/1972.

Nimbus 5 data is now available for 348/1972 - 365/1974, and should
be available for 1/1975 - 365/1975 in the near future. Note that
a small proportion of days are missing for both instruments.

Channels:

Channels A, B, C, D, E*, F* will be given for Nimbus 4, although
only channel A can be used for the whole period; channels E* and F*
were intermittent; channels B, C and D cannot be used after 107/1972.
(* indicates a declouded channel - an upper envelope has been fitted
to the radiance data to give a 'clear column' radiance.)

Channels B12, B23, B34, B4, A1, A2*, A3*, A4* and C4* are given for
Nimbus 5, although the A channels were intermittently in a less
accurate non-linear mode.

To order copies of these tapes, please write to:

Mrs. J. Varney,
Dept. of Atmospheric Physics,
Clarendon Laboratory,
Oxford OX1 3PU,
England

Tape formats:

The data are in binary 12-bit words (integers) with a maximum of
2048 per block. All data are radiances; no retrievals are available.

One 9 track tape holds all the Nimbus 4 data and just over one year's
Nimbus 5 data.

There are three kinds of data:

(a) data along each orbit every 4° latitude in the form of two
41 x 14 arrays for each day and each channel, corresponding to the
14 orbits possible each day (one array is for day, the other for night).
(b) data on a latitude-longitude grid every 4° latitude and 10°
longitude; one array per channel per day;
(c) zonal means, fourier coefficients up to wavenumber 6 and standard
deviation around latitude circles every 4° latitude.
5. Satellite sounder data.

The Nimbus 5 chopper radiometer data is available for 12 December 1972 to 31 December 1974 for latitude steps each 4° along the orbital tracks, and with derived grids each 12 hours. These low volume data tapes are at Clarendon Laboratory, Oxford University, and at NCAR. The data set will be extended to later dates. The channels are B12 (about 2 mb), B23, B34 (about 5 mb), B4 and A1. Similar data along orbital tracks should become available from Control Data Corporation for Nimbus 4 (April 1970 through about April 1972).

SIRS A and B data extend from 14 April 1969 to 8 April 1971. Some channels are missing during SIRS B. The Archive of NOAA VTPR sounder data started November 1972. See Figure ___ which shows the availability of the sounding data.

For each of the satellite sounder channels in the stratosphere, recommend that data sets of best calibrated radiances be preserved each 2° to 3° of latitude (along the orbit) in a low volume data set. The top of the orbit should be sampled each 300 km also. If the data are based on scanners, additional points to the sides of the orbit should be saved, spaced about 300 km apart.

Also see the list of sounder data in Chapter 4.
8. Satellite sounding data.

These data are discussed more extensively in the satellite chapter. We haven't included microwave data, stratospheric SCR data, or the short term HIRS data in this list. See Figure ____ in Chapter ____.

a. SIRS-A. 8 channels. 14 Apr 69 to 30 Apr 70 on 6 tapes at NCAR. Data past September 1970 is said to exist.

b. IRIS. 15 Apr 69-22 Jul 69. For profiles of temperature, water vapor, and ozone.

c. SIRS-B. 14 channels. 8 April 1970-8 April 1971 on 6 tapes at NCAR. Had various channel problems.


e. ITPR. 7 channels. 11 December 1972-14 May 1973.

Jenne wrote a text about NASA data in 1976. The following extract only contains the information about sounding data.

Chapter 10b

**NASA Satellite Data**

**Section 1**

Information About NIMBUS Satellite Data

We appreciate the help of Lewis Allison, Joseph Barksdale, and many others at NASA for helping to prepare this information.

C. **Nimbus 3**

600 nmi, sun synchronous, ascending equator crossing at local noon, 81 degree retrograde orbit, period 107 min. Successive orbits cross the equator with 26° of longitude separation.

3. **SIRS - A** - Satellite Infrared Spectrometer (for soundings)

8 channels. (7 CO₂ channels plus window) Field of view 11.5°. Only looks down. Spot size 120 nmi diameter.

4/14/69 - 9/29/70, then partial

Kleespies at CSU has taken the original 55 tapes and condensed them to 6 tapes (9tr - 1600) at NCAR. For the period 4/14/69 - 4/30/70.


Spot size is 150 km, from 1100 km (8° opening)

Time: 4/15/69 - 7/22/69 for only the whole 15-20μ range

Volume: Rate 3750 bits/sec. on satellite

100 days x 21 hr./day x 3750 bits/sec. is \(2.83 \times 10^{10}\) bits

795 raw tapes (7 tr - 556)

925 NMRT tapes (7 tr - 800)

Recommend: that the format be inspected for likely large reduction in volume without information loss.
D. Nimbus 4

600 nmi, sun synchronous, ascending equator crossing at local noon, 81 degree retrograde orbit. Period 107 min. Successive orbits have 26 degrees longitude separation at equator.

3. IRIS - Infrared Interferometer Spectrometer.
   For vertical profiles of temperature, water vapor, and ozone.
   Some improvements over the IRIS on Nimbus 3.
   Time: 4/8/70 - 1/25/72
   Noisy rear reference after 4/10/71
   Volume: Raw data 4/8/70 - 25 Jan 72 (Started going bad Feb 71)
   300 convert NMRT tapes, 9 tr - 1600, 2880 orbits, for period to 1 Feb 71. 49 days missing.

4. SIRS-B Satellite Infrared Spectrometer
   Has 14 channels. One is in window, seven in CO₂ band, six are in water vapor rotation band. The new channels 9-14 (not in SIRS-A) allow one to estimate the vertical water vapor distribution which can also permit improved temperature distributions.
   Time: 4/8/70 - 6/9/70 Then it degraded rapidly
   Chan. 6 and 12 problems 4/8/70 - 4/22/70
   Chan. 6, 9, 12 problems 4/23/70 - 4/29/70
   Chan. 1, 6, 9, 12 problems 4/29/70 - 5/6/70
   Chan. 6, 9, 12 problems 5/6/70 - 6/9/70
   NCAR has 6 tapes (9 tr - 1600) with these data (from 20 lower density original tapes). Prepared by Kleespies from CSU. For the period 4/8/70 - 4/8/71. Note difference in period. Channel 14 also bad soon after launch. Chan. 10 got slowly worse with time. Other calibration adjustments made to other channels. See Nimbus data catalog. SIRS-B less noisy than SIRS-A in stratosphere.

8. SCR - Selective Chopper Radiometer

To determine the temperature in 6 layers from earth or cloud top to 60 km. height. Spot size 100 miles for upper two channels, 70 miles lower four channels.

Time: 4/8/70 - 9/1/72
   Chan. 5 and 6 bad: 3/19/71 - 5/1/71
   9/4/71 - 12/10/71
   1/18/72 - 2/7/72
   Chan. 3 and 4 bad: 4/25/72 - 9/1/72

Volume of basic data? See sheet on data at Oxford.
E. Nimbus 5
1112 km, sun synchronous, ascending equator crossing at local noon, 81 degree retrograde inclination, successive orbits are separated by 27 degrees longitude at equator. Orbital period 107 min.

4. ITPR - Infrared Temperature Profile Radiometer
Has higher spatial resolution (about 30 km. spot) than previous sounders. Has 7 channels, two are in the window, 4 in CO₂ band, one in water vapor band. These peak about sfc, 900, 700, 400, 100, 30 mb.
Time: 12/11/72 until 5/14/73 (scan disabled except for special requests)
Volume: Data frame has 36 earth positions for each channel. Six data frames on 480 60-bit words in a record. There are about 640 records per day. $1.85 \times 10^7$ bits per full day.

5. SCR - Selective Chopper Radiometer
- For vertical temperature of the atmosphere up to 50 km.
- Water vapor distribution in the atmosphere.
- Density of ice particles in cirrus clouds.

Time: From 12/11/72 until 11/30/73. B channels only from 11/30/73. Data not collected from 6/3/75 until 8/12/76 and then every other day.
Volume of basic data? See sheet on data at Oxford.

F. Nimbus 6
1100 km, sun synchronous, ascending equatorial crossing at local noon. 81 degree retrograde inclination. Orbit time 107 min. Successive orbits have 26.8 degrees of longitude separation at equator.

6. PMR - Pressure Modulator Radiometer
To measure temperature distribution between 40-85 km. altitude. Subsat spot about 500 km. Effectively about 4 channels.
Time: Full from 6/16/75 until 10/18/75. Then channel 1 became anomalous until 8/5/76. Data collection has been limited by tape recorder. A failure on 6/10/76 to about 65 min. per orbit.
Volume: ?
7. **LRIR** - Limb Radiance Inversion Radiometer
To obtain vertical distribution of temperature, ozone and water vapor from 15-60 km. altitude, global. (65°S to 85°N)
Vertical resolution about 3 km.

Temp. ≠ 30K, ozone ≠ 20% at 1 mb, water vapor ≠ 50% at 1 mb, geostrophic winds ≠ 10 m/sec. at 5,2,1 mb. (1 mb. is at about 48 km.)

Vertical scan in 4 spectral regions.

Time: From 6/19/75 Alternated on times with ESMR. Data were usually collected for one or two days and then it was shut off for one or two, etc. Operation terminated 1/7/76.

Archive (The processing is still (Aug. 77) in progress):

- Cleaned radiance tapes contain a vertical scan each 12 km. (450 x 10^6 bits for the 7 months).
- Inverted profile tapes contain radiance profiles and inverted data each 4° latitude along the orbits. (25 x 10^6 bits).
- Map tapes. The inverted data are used with other meteorological data to produce analyses interpolated in time and space (20 x 10^6 bits).
- These data are archived at NCAR.

A similar instrument is planned for launch with NIMBUS G in Sept. 1978. Because of cooling requirements, it also has a planned life of 7 months.

8. **TWERLE** - Tropical Wind Energy Conversion and Reference Level Experiment.

To track balloons drifting at about 150 mb. in the tropics and southern hemisphere.
SECTION 5
THE INFRARED TEMPERATURE PROFILE
RADIOMETER (ITPR) EXPERIMENT

by
W. L. Smith, H. B. Howell, J. C. Fischer, M. C. Chalfant and D. T. Hilleary
National Oceanic and Atmospheric Administration
National Environmental Satellite Service
Washington, D. C.

Data was 12/11/72 - 5/14/73
There was usually no cross-track scanning

5.1 Introduction

The primary objective of the ITPR experiment is to describe the three-dimensional temperature field within the earth's atmosphere. The ITPR represents an improvement over previous satellite infrared radiometers because its higher spatial resolution allows more accurate determination of atmospheric temperature profiles in partly cloudy areas.

With a cross-course scan, described in Section 5.3.1, the ITPR will provide nearly contiguous coverage of the earth's surface over a 24-hour period.

Figure 5-1 illustrates a typical 24-hour coverage of the Southern Hemisphere.

5.2 Description of the Experiment

The ITPR simultaneously measures the upwelling radiant flux in seven spectral intervals of the infrared spectrum:

- Two intervals in atmospheric "window" (low absorption) regions near 3.7 μm and 11 μm
- Four intervals in the carbon dioxide absorption band near 15 μm
- One interval in the rotational water vapor absorption band near 20 μm

A detailed description of these spectral intervals, and the spectral response functions for the ITPR are given in Table 5-1 and Figures 5-2 to 5-8 respectively.

Satellite observations of the earth's radiant flux in the seven spectral bands of the ITPR provide knowledge of the surface temperature (from the two window channels) as well as the temperature at a number of discrete levels in the atmo-
Figure 1-8. Atmospheric Temperature over the Caribbean near Kingston, Jamaica, obtained by conventional radiosondes (dashed lines) and from the SIRS data (solid lines).
Figure 1-10. Objective 500 mb Analysis Obtained from 12 hour Forecast, Valid at 12 GMT, and SIRS Derived Heights Obtained between 0300 GMT and 1658 GMT. The time and geographical coverage of the SIRS measurements are indicated by the orbital track segments superimposed on the analysis.

From N III data catalog, Part I
The Numerus III data catalog has charts like this for several (all?)
of the SIRS channels.

- Roy Janse  Mar 2006

This text is in
the NCAR Library

\[ S(\lambda) = \text{QE} \times T_{\text{FIL}} \]

\[ 10^{-1} \]
\[ 10^{-2} \]
\[ 10^{-3} \]
\[ 10^{-4} \]
\[ 10^{-5} \]

.15 .16 .17 .18 .19 .20 .21 .22

WAVELENGTH (MICRONS)

Figure 1-13. Quantum Efficiency \times Transmittance of Filters for the 1800A Sensor

And The N-4 catalog has 5 similar plots as
   - R Janse  Mar 2006
   \[ 1-27 \]
SIRS soundings on NMC tapes

1. The following SIRS soundings are good reports on the original NMC tapes for 1962-1972

For both GOZ and 12Z, year/month summary by arranged types, category 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Ann</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>229</td>
<td>3877</td>
<td>7695</td>
<td>9632</td>
<td>7735</td>
<td>5563</td>
<td>3739</td>
<td>6142</td>
</tr>
<tr>
<td>1970</td>
<td>7467</td>
<td>7149</td>
<td>3727</td>
<td>3283</td>
<td>3973</td>
<td>3030</td>
<td>4429</td>
<td>4450</td>
<td>4444</td>
<td>4733</td>
<td>6866</td>
<td>6721</td>
<td>60272</td>
</tr>
<tr>
<td>1971</td>
<td>3954</td>
<td>5031</td>
<td>5189</td>
<td>1075</td>
<td>2304</td>
<td>2095</td>
<td>2197</td>
<td>1623</td>
<td>0</td>
<td>0</td>
<td>3606</td>
<td>3741</td>
<td>30715</td>
</tr>
<tr>
<td>1972</td>
<td>4209</td>
<td>2268</td>
<td>3908</td>
<td>2702</td>
<td>3721</td>
<td>1266</td>
<td>454</td>
<td>158</td>
<td>57</td>
<td>0</td>
<td>0</td>
<td>19091</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15530</td>
<td>14448</td>
<td>12824</td>
<td>7060</td>
<td>10227</td>
<td>10268</td>
<td>14775</td>
<td>15857</td>
<td>12533</td>
<td>10353</td>
<td>14211</td>
<td>16604</td>
<td>154690</td>
</tr>
</tbody>
</table>

2. Other reports had trouble with length or were identical duplicates.

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Ann</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>74</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>7</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>96</td>
<td>304</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>417</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>6</td>
<td>66</td>
<td>0</td>
<td>7</td>
<td>83</td>
<td>1</td>
<td>0</td>
<td>344</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>517</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>3087</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>3105</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3092</td>
<td>66</td>
<td>13</td>
<td>91</td>
<td>97</td>
<td>378</td>
<td>345</td>
<td>0</td>
<td>2</td>
<td>11</td>
<td>35</td>
<td>4131</td>
<td></td>
</tr>
</tbody>
</table>
Figure 5-1. Weighting Functions of the Temperature Sounding Channels of the Nimbus 5 SCR. The height scale is approximate. The abscissa is a weighting function on an arbitrary scale.

SCR Data: Jul 1970 → Dec 1974

From the Nimbus 5 Data Catalog, Vol. 5
Nasa, Goddard, 1974

Note SCR data at Goddard:
N4 SCR 7 1970 07-27 to 1973 01-30
N5 SCR 7 1972 12-13 to 1974 12-26

(Handwritten note on page)
1. Data for Raob stations N. of 60°N

2. Daily grid analyses
   (for comparisons or for bogus)

3. The Document Project
   - Now 390 documents
   - Over 22,300 pages

Roy Tenne
NCAR
April 3, 2006
Data for Rawinsonde Stations North of 60⁰ N
(Roy Jenne, Dennis Joseph, and Joey Comeaux, NCAR, Nov 2001)

The data coverage of daily rawinsonde data at NCAR for stations north of 60⁰ N is given in Table 1. This list is for fixed stations. There are rawinsondes from the Russian drifting ice island stations during 1950 - 1991, but those are not given here. NCAR has more detailed on-line tables that can be browsed for every station in the world. These show the count of raobs during each year-month in the record. Similar counts for each separate pibal (winds-only) station are also given.

<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>LAT</th>
<th>LON</th>
</tr>
</thead>
<tbody>
<tr>
<td>01001w</td>
<td>R JAN MAYEN (NOR-NAVY)</td>
<td>N70.90</td>
<td>-8.67</td>
</tr>
<tr>
<td>01004w</td>
<td>R NY-ALFRED II</td>
<td>N78.90</td>
<td>11.93</td>
</tr>
<tr>
<td>0105w</td>
<td>R ISFORD RADIO</td>
<td>N78.00</td>
<td>13.63</td>
</tr>
<tr>
<td>0102w</td>
<td>R MURCHISON BAY</td>
<td>N80.00</td>
<td>18.30</td>
</tr>
<tr>
<td>01028w</td>
<td>R BJORN AAROYIA</td>
<td>N74.50</td>
<td>19.02</td>
</tr>
<tr>
<td>01030w</td>
<td>R TROMSO/KATTOR</td>
<td>N69.70</td>
<td>19.02</td>
</tr>
<tr>
<td>01152w</td>
<td>R BODO VI (CIV/MIL)</td>
<td>N67.20</td>
<td>14.40</td>
</tr>
<tr>
<td>01241w</td>
<td>R ORLAND III (NOR-AP)</td>
<td>N63.70</td>
<td>9.60</td>
</tr>
<tr>
<td>01384w</td>
<td>R OSLO/GARBERMOE</td>
<td>N60.20</td>
<td>11.10</td>
</tr>
<tr>
<td>02057w</td>
<td>R LULEA/KALLAX TO 02185</td>
<td>N65.50</td>
<td>22.13</td>
</tr>
<tr>
<td>02062w</td>
<td>R OSTERSUND/FRONSAND TO 0222</td>
<td>N63.10</td>
<td>14.50</td>
</tr>
<tr>
<td>02066w</td>
<td>R SUNDSVALL/HARNOSAND TO 0</td>
<td>N62.50</td>
<td>17.45</td>
</tr>
<tr>
<td>02185w</td>
<td>R LULEA/KALLAX AF</td>
<td>N65.50</td>
<td>22.13</td>
</tr>
<tr>
<td>02225w</td>
<td>R OSTERSUND/FRONSAND</td>
<td>N63.10</td>
<td>14.50</td>
</tr>
<tr>
<td>0235w</td>
<td>R SUNDSVALL/HARNOSAND</td>
<td>N62.50</td>
<td>17.45</td>
</tr>
<tr>
<td>0236w</td>
<td>R SODANKYLA</td>
<td>N67.30</td>
<td>26.65</td>
</tr>
<tr>
<td>02935w</td>
<td>R JYVASKYLA FAFB</td>
<td>N62.40</td>
<td>25.67</td>
</tr>
<tr>
<td>02963w</td>
<td>R JOKIOINEN</td>
<td>N60.80</td>
<td>23.50</td>
</tr>
<tr>
<td>02974w</td>
<td>R HELSINKI/VANTAA</td>
<td>N60.30</td>
<td>24.97</td>
</tr>
<tr>
<td>0305w</td>
<td>R LERWICK/SHELTAND IS</td>
<td>N60.10</td>
<td>-1.18</td>
</tr>
<tr>
<td>04018w</td>
<td>R KFELAVIK (USN)</td>
<td>N63.10</td>
<td>-22.60</td>
</tr>
<tr>
<td>04202w</td>
<td>R THULE AB (USAF)</td>
<td>N76.50</td>
<td>-68.75</td>
</tr>
<tr>
<td>04220w</td>
<td>R GODDETMINDE</td>
<td>N68.70</td>
<td>-52.85</td>
</tr>
<tr>
<td>04231w</td>
<td>R SONDRESTROM (USAF)</td>
<td>N67.00</td>
<td>-50.80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>LAT</th>
<th>LON</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>1970</th>
<th>1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1970</th>
<th>1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>b</td>
<td>bb</td>
</tr>
<tr>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>b</td>
<td>bb</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>b</td>
<td>b</td>
</tr>
</tbody>
</table>

Iceland

<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>LAT</th>
<th>LON</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>1970</th>
<th>1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

1948
<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>LAT</th>
<th>LON</th>
</tr>
</thead>
<tbody>
<tr>
<td>04270w</td>
<td>R NARSSARSSUAQ</td>
<td>61.10</td>
<td>-45.42</td>
</tr>
<tr>
<td>04310w</td>
<td>R NORD</td>
<td>81.60</td>
<td>-16.67</td>
</tr>
<tr>
<td>04320w</td>
<td>R DANMARKSHAVN</td>
<td>76.70</td>
<td>-18.77</td>
</tr>
<tr>
<td>04339w</td>
<td>R SCORESBYSUND</td>
<td>70.40</td>
<td>-21.95</td>
</tr>
<tr>
<td>04340w</td>
<td>R KAP TOBIN TO</td>
<td>70.40</td>
<td>-21.97</td>
</tr>
<tr>
<td>04360w</td>
<td>R ANGMAGSSALIK</td>
<td>65.60</td>
<td>-37.63</td>
</tr>
<tr>
<td>06011w</td>
<td>R THORSHAVN</td>
<td>62.00</td>
<td>-6.77</td>
</tr>
<tr>
<td>20046w</td>
<td>R GMIO IM. KRENKELJA/HEISA</td>
<td>80.60</td>
<td>58.05</td>
</tr>
<tr>
<td>20047w</td>
<td>R BUKHTA TIKHAYA/GUKER IS.</td>
<td>80.40</td>
<td>52.80</td>
</tr>
<tr>
<td>20069w</td>
<td>R O. VIZE</td>
<td>79.50</td>
<td>76.98</td>
</tr>
<tr>
<td>2017w</td>
<td>R BARENCEBURG</td>
<td>78.00</td>
<td>14.22</td>
</tr>
<tr>
<td>20274w</td>
<td>R O. UYEDINENIYA</td>
<td>77.50</td>
<td>82.23</td>
</tr>
<tr>
<td>20292w</td>
<td>R MYS CHELYUSKIN</td>
<td>77.70</td>
<td>104.28</td>
</tr>
<tr>
<td>20353w</td>
<td>R MYS ZELANIYA</td>
<td>76.90</td>
<td>68.58</td>
</tr>
<tr>
<td>20357w</td>
<td>R RUSSKAYA</td>
<td>76.10</td>
<td>63.56</td>
</tr>
<tr>
<td>20667w</td>
<td>R STANCIA IM. POPOVA</td>
<td>73.30</td>
<td>70.03</td>
</tr>
<tr>
<td>20674w</td>
<td>R O. DIKSON</td>
<td>73.50</td>
<td>80.42</td>
</tr>
<tr>
<td>20744w</td>
<td>R MALYE KARKULI</td>
<td>72.30</td>
<td>52.73</td>
</tr>
<tr>
<td>20891w</td>
<td>R KHATANGA</td>
<td>71.90</td>
<td>102.47</td>
</tr>
<tr>
<td>21146w</td>
<td>R unknown</td>
<td>76.60</td>
<td>148.58</td>
</tr>
<tr>
<td>21358w</td>
<td>R O. ZHOKHOVA</td>
<td>76.10</td>
<td>152.83</td>
</tr>
<tr>
<td>21432w</td>
<td>R O. KOTEL'NYY</td>
<td>76.00</td>
<td>137.90</td>
</tr>
<tr>
<td>21504w</td>
<td>R O. PREOBRAZHENIYA</td>
<td>74.60</td>
<td>112.93</td>
</tr>
<tr>
<td>21647w</td>
<td>R MYS SALAUROVA</td>
<td>73.20</td>
<td>143.53</td>
</tr>
<tr>
<td>21824w</td>
<td>R TIKSI</td>
<td>71.60</td>
<td>128.85</td>
</tr>
<tr>
<td>21946w</td>
<td>R CHOKURDAX</td>
<td>70.60</td>
<td>147.88</td>
</tr>
<tr>
<td>21965w</td>
<td>R O. CHELYUSKIN</td>
<td>70.60</td>
<td>162.40</td>
</tr>
<tr>
<td>21982w</td>
<td>R O. VRANGELYA</td>
<td>70.70</td>
<td>-178.53</td>
</tr>
<tr>
<td>22113w</td>
<td>R MURMANSK</td>
<td>68.90</td>
<td>33.12</td>
</tr>
<tr>
<td>2216w</td>
<td>R KANIN NOS (SEE 222710)</td>
<td>68.60</td>
<td>43.30</td>
</tr>
<tr>
<td>22217w</td>
<td>R KANDALAKSA</td>
<td>67.10</td>
<td>32.43</td>
</tr>
<tr>
<td>22271w</td>
<td>R SOJNA</td>
<td>67.80</td>
<td>44.17</td>
</tr>
<tr>
<td>22522w</td>
<td>R KEM-PORT</td>
<td>64.90</td>
<td>34.78</td>
</tr>
<tr>
<td>22550w</td>
<td>R ARHANGEL'SK</td>
<td>64.50</td>
<td>40.50</td>
</tr>
<tr>
<td>22768w</td>
<td>R SENKURAK</td>
<td>62.10</td>
<td>42.90</td>
</tr>
<tr>
<td>22802w</td>
<td>R SORTOVALA</td>
<td>61.70</td>
<td>30.72</td>
</tr>
<tr>
<td>22820w</td>
<td>R PETROZAVODSK</td>
<td>61.80</td>
<td>34.27</td>
</tr>
<tr>
<td>22845w</td>
<td>R KARGOPOL'</td>
<td>61.50</td>
<td>38.93</td>
</tr>
<tr>
<td>23022w</td>
<td>R AMDERMA</td>
<td>69.70</td>
<td>61.68</td>
</tr>
<tr>
<td>23074w</td>
<td>R PUDINKA</td>
<td>69.40</td>
<td>86.17</td>
</tr>
<tr>
<td>23077w</td>
<td>R unknown</td>
<td>69.30</td>
<td>88.25</td>
</tr>
<tr>
<td>23078w</td>
<td>R NORILSK</td>
<td>69.30</td>
<td>88.22</td>
</tr>
<tr>
<td>23146w</td>
<td>R MYS KAMENNIY</td>
<td>68.40</td>
<td>73.60</td>
</tr>
</tbody>
</table>

**NE Greenland. I was on a resupply flight to NE Greenland.**

Rawinsonde Stns N of 60°, Page 2 of 4
<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>LAT</th>
<th>LON</th>
</tr>
</thead>
<tbody>
<tr>
<td>23205w</td>
<td>R NAR'JAN-MAR</td>
<td>N 67.60</td>
<td>53.02</td>
</tr>
<tr>
<td>23274w</td>
<td>R IGARKA</td>
<td>N 67.40</td>
<td>86.57</td>
</tr>
<tr>
<td>23330w</td>
<td>R SALEHARD</td>
<td>N 66.50</td>
<td>66.53</td>
</tr>
<tr>
<td>23418w</td>
<td>R PECHORA</td>
<td>N 65.10</td>
<td>57.10</td>
</tr>
<tr>
<td>23472w</td>
<td>R TURUHANSK</td>
<td>N 65.70</td>
<td>87.95</td>
</tr>
<tr>
<td>23552w</td>
<td>R TARKO-SALE</td>
<td>N 64.90</td>
<td>77.82</td>
</tr>
<tr>
<td>23804w</td>
<td>R SYKTYVKAR</td>
<td>N 61.60</td>
<td>50.85</td>
</tr>
<tr>
<td>23884w</td>
<td>R BOR</td>
<td>N 61.60</td>
<td>90.00</td>
</tr>
<tr>
<td>23921w</td>
<td>R IVDEL'</td>
<td>N 60.60</td>
<td>60.43</td>
</tr>
<tr>
<td>23933w</td>
<td>R KHANTRY-MANSIYSK</td>
<td>N 60.90</td>
<td>69.07</td>
</tr>
<tr>
<td>23955w</td>
<td>R ALEKSANDROVSKOYE</td>
<td>N 60.40</td>
<td>77.87</td>
</tr>
<tr>
<td>24125w</td>
<td>R OLENEK</td>
<td>N 68.50</td>
<td>112.43</td>
</tr>
<tr>
<td>24266w</td>
<td>R VERKHNYANSK</td>
<td>N 67.50</td>
<td>133.38</td>
</tr>
<tr>
<td>24343w</td>
<td>R ZIGANSK</td>
<td>N 66.70</td>
<td>123.40</td>
</tr>
<tr>
<td>24507w</td>
<td>R TURA</td>
<td>N 64.20</td>
<td>100.23</td>
</tr>
<tr>
<td>24579w</td>
<td>R unknow</td>
<td>N 62.00</td>
<td>129.72</td>
</tr>
<tr>
<td>24641w</td>
<td>R VILVUYSK</td>
<td>N 63.70</td>
<td>121.62</td>
</tr>
<tr>
<td>24688w</td>
<td>R OMYAKON</td>
<td>N 63.40</td>
<td>142.80</td>
</tr>
<tr>
<td>24726w</td>
<td>R MIRNYY</td>
<td>N 62.50</td>
<td>114.00</td>
</tr>
<tr>
<td>24759w</td>
<td>R YAKUTSK OBSERVATORY</td>
<td>N 62.00</td>
<td>129.72</td>
</tr>
<tr>
<td>24790w</td>
<td>R SUSUMAN</td>
<td>N 62.70</td>
<td>148.13</td>
</tr>
<tr>
<td>24793w</td>
<td>R SHUTRNOVOY</td>
<td>N 62.80</td>
<td>149.76</td>
</tr>
<tr>
<td>24817w</td>
<td>R ERBOGACEN</td>
<td>N 61.20</td>
<td>108.02</td>
</tr>
<tr>
<td>24908w</td>
<td>R VANVARA</td>
<td>N 60.30</td>
<td>102.27</td>
</tr>
<tr>
<td>24944w</td>
<td>R OLEKMINSK</td>
<td>N 60.40</td>
<td>120.42</td>
</tr>
<tr>
<td>24959w</td>
<td>R YAKUTSK</td>
<td>N 62.00</td>
<td>129.75</td>
</tr>
<tr>
<td>25042w</td>
<td>R O AYON</td>
<td>N 69.90</td>
<td>167.97</td>
</tr>
<tr>
<td>25123w</td>
<td>R CHERSKIY</td>
<td>N 68.70</td>
<td>161.30</td>
</tr>
<tr>
<td>25173w</td>
<td>R MIS SHIMDTA</td>
<td>N 68.90</td>
<td>-179.48</td>
</tr>
<tr>
<td>25399w</td>
<td>R MIS UZLEN</td>
<td>N 66.10</td>
<td>-169.83</td>
</tr>
<tr>
<td>25400w</td>
<td>R ZYRANKA</td>
<td>N 65.70</td>
<td>150.90</td>
</tr>
<tr>
<td>25428w</td>
<td>R ONOLON</td>
<td>N 65.20</td>
<td>160.50</td>
</tr>
<tr>
<td>25551w</td>
<td>R MARKovo</td>
<td>N 64.60</td>
<td>170.42</td>
</tr>
<tr>
<td>25563w</td>
<td>R ANADYR'</td>
<td>N 64.70</td>
<td>177.50</td>
</tr>
<tr>
<td>25594w</td>
<td>R BUKHTA PROVIDENIYA</td>
<td>N 64.40</td>
<td>-173.23</td>
</tr>
<tr>
<td>25677w</td>
<td>R BERINGOVSKAJA</td>
<td>N 63.00</td>
<td>179.32</td>
</tr>
<tr>
<td>25703w</td>
<td>R SEJMCAN</td>
<td>N 62.90</td>
<td>152.42</td>
</tr>
<tr>
<td>25822w</td>
<td>R GIZIGA</td>
<td>N 61.90</td>
<td>160.37</td>
</tr>
<tr>
<td>25954w</td>
<td>R KORF</td>
<td>N 60.30</td>
<td>166.00</td>
</tr>
<tr>
<td>70026w</td>
<td>R POINT BARROW</td>
<td>N 71.30</td>
<td>-156.78</td>
</tr>
<tr>
<td>70086w</td>
<td>R BARTER ISLAND</td>
<td>N 70.10</td>
<td>-143.63</td>
</tr>
<tr>
<td>70107w</td>
<td>R CAPE THOMPSON</td>
<td>N 68.10</td>
<td>-165.76</td>
</tr>
<tr>
<td>70133w</td>
<td>R KOTZEBUE</td>
<td>N 66.80</td>
<td>-162.63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>LAT</th>
<th>LON</th>
</tr>
</thead>
<tbody>
<tr>
<td>1948</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ID</td>
<td>NAME</td>
<td>LAT</td>
<td>LON</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>70174w</td>
<td>R BETTLES FIELD</td>
<td>N 66.90</td>
<td>-151.52</td>
</tr>
<tr>
<td>70194w</td>
<td>R FT YUKON MUNI</td>
<td>N 66.50</td>
<td>-145.27</td>
</tr>
<tr>
<td>70200w</td>
<td>R Nome AP</td>
<td>N 64.50</td>
<td>-165.43</td>
</tr>
<tr>
<td>70204w</td>
<td>R GAMBERL</td>
<td>N 63.80</td>
<td>-171.60</td>
</tr>
<tr>
<td>70219w</td>
<td>R BETHEL</td>
<td>N 60.70</td>
<td>-161.80</td>
</tr>
<tr>
<td>70222w</td>
<td>R GALENA AIRPORT</td>
<td>N 64.70</td>
<td>-156.93</td>
</tr>
<tr>
<td>70231w</td>
<td>R McGRATH</td>
<td>N 62.90</td>
<td>-155.62</td>
</tr>
<tr>
<td>70261w</td>
<td>R FAIRBANKS</td>
<td>N 64.80</td>
<td>-147.87</td>
</tr>
<tr>
<td>70263w</td>
<td>R FORT GREELEY</td>
<td>N 63.90</td>
<td>-145.71</td>
</tr>
<tr>
<td>70266w</td>
<td>R Ft.Greeley</td>
<td>N 64.00</td>
<td>-146.23</td>
</tr>
<tr>
<td>70267w</td>
<td>R Ft.Greeley/Allen AAF</td>
<td>N 63.60</td>
<td>-145.78</td>
</tr>
<tr>
<td>70268w</td>
<td>R Blair Lakes Gnry RG</td>
<td>N 64.30</td>
<td>-147.65</td>
</tr>
<tr>
<td>70273w</td>
<td>R Anchorage IAP/PT. Camp</td>
<td>N 61.10</td>
<td>-149.98</td>
</tr>
<tr>
<td>70291w</td>
<td>R Northway</td>
<td>N 62.90</td>
<td>-141.96</td>
</tr>
<tr>
<td>70292w</td>
<td>R Tanacross</td>
<td>N 63.30</td>
<td>-143.33</td>
</tr>
<tr>
<td>71043w</td>
<td>R Norman Wells (UA)</td>
<td>N 65.20</td>
<td>-126.75</td>
</tr>
<tr>
<td>71051w</td>
<td>R Sachs Harbour</td>
<td>N 72.00</td>
<td>-125.27</td>
</tr>
<tr>
<td>71072w</td>
<td>R Mould Bay</td>
<td>N 76.20</td>
<td>-119.32</td>
</tr>
<tr>
<td>71074w</td>
<td>R Isachsen</td>
<td>N 78.70</td>
<td>-103.53</td>
</tr>
<tr>
<td>71081w</td>
<td>R Hall Beach</td>
<td>N 68.70</td>
<td>-81.25</td>
</tr>
<tr>
<td>71082w</td>
<td>R Alert</td>
<td>N 82.50</td>
<td>-62.33</td>
</tr>
<tr>
<td>71909w</td>
<td>R Iqaluit (UA)</td>
<td>N 63.70</td>
<td>-68.55</td>
</tr>
<tr>
<td>71915w</td>
<td>R Coral Harbour</td>
<td>N 64.20</td>
<td>-83.37</td>
</tr>
<tr>
<td>71917w</td>
<td>R Eureka</td>
<td>N 80.00</td>
<td>-85.93</td>
</tr>
<tr>
<td>71924w</td>
<td>R Resolute</td>
<td>N 74.70</td>
<td>-94.95</td>
</tr>
<tr>
<td>71925w</td>
<td>R Cambridge Bay</td>
<td>N 69.10</td>
<td>-105.12</td>
</tr>
<tr>
<td>71926w</td>
<td>R Baker Lake (UA)</td>
<td>N 64.30</td>
<td>-96.00</td>
</tr>
<tr>
<td>71934w</td>
<td>R Pt Smith (UA)</td>
<td>N 60.00</td>
<td>-111.93</td>
</tr>
<tr>
<td>71957w</td>
<td>R Inuvik (UA)</td>
<td>N 68.30</td>
<td>-133.53</td>
</tr>
<tr>
<td>71964w</td>
<td>R Whitehorse</td>
<td>N 60.70</td>
<td>-135.07</td>
</tr>
<tr>
<td>72968w</td>
<td>R Aklavik To 729570</td>
<td>N 68.20</td>
<td>-135.00</td>
</tr>
<tr>
<td>99001w</td>
<td>R unknown</td>
<td>N 62.00</td>
<td>-33.00</td>
</tr>
<tr>
<td>99013w</td>
<td>R Atlantic Sta H</td>
<td>N 66.00</td>
<td>2.00</td>
</tr>
<tr>
<td>99063w</td>
<td>R unknown</td>
<td>N 62.00</td>
<td>-33.00</td>
</tr>
<tr>
<td>99360w</td>
<td>R unknown</td>
<td>N 66.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

---

**North Canada starts in 1948**
Daily Grid Analyses
(for Bogus or for comparisons)

We understand that some groups in Europe are gathering daily surface observations for 1850 – 1880, and then they will depend on the SLP grid points for later data. But remember that these grids were read at a rather low resolution, often 5° lat by 10° lon on a diamond grid.

N. Hemisphere

<table>
<thead>
<tr>
<th>TABLE 1. SELECTED EARLY GRID ANALYSES FOR N. HEMISPHERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. N. Hemisphere daily SLP grids, 1899 – on (at NCAR). Before that the UK has grids for about 1880 – 1898.</td>
</tr>
<tr>
<td>b. N. Hem 500 mb daily Z (1946 – on) 1946 – on</td>
</tr>
<tr>
<td>d. Published N. Hem 3 km pressure maps (10/1932 – 12/1940). Includes tables of sources of observations, with range of years. There are some regional gaps in the maps. Document RJ0 at NCAR has selected maps (document will be ready by April 2004.</td>
</tr>
</tbody>
</table>

21. Early Map Analyses for S. Hemisphere

Some early S. Hemisphere grid analyses at NCAR are listed in Table 2 that could be used to compare with reanalysis output or used as bogus points. Most of the hand maps used methods to give backward and forward continuity in time. Satellite pictures were likely routinely used to help the analysis from about 1965 – on.

The SLP maps from New Zealand are only for 150 degrees of longitude, but they would help the whole hemisphere. Also, there may be an option to get more cloud winds for the Americas sector for 1967 – 1972 when we need it most. The Australian 500 mb Z grids start 08/1968 and may be very useful to aid the analysis before VTPR starts 11/1972. There may be an option to digitize Australian daily SLP and 500 mb maps for 1959 – 1968. This would take several years and be costly. It is not being considered now.

This is from Doc 0366 at NCAR, on line 72
TABLE 2. DAILY GRIDS FOR S. HEMISPHERE

These grid analyses can be used as analyses or as possible bogus points for another analysis.

- DS 100 S. Hem: S. Africa, daily SLP (01/1950 – 05/1957), then IGY data starts.
- DS 102.0 S. Hem: IGY daily SLP and 500 mb Z (06/1957 – 12/1958)
- DS 108.0 S. Hem: Stack of Australia grids are for 04/1972 – on. Objective analyses; probably do not need these. (Note that the VTPR sounder starts 11/1972.)
- Australia has S. Hem microfilm maps of sfc SLP and 500 mb Z for the whole period 1957 – on. Most were never digitized. The maps are online in Australia.

22. How to Find the Online Documents at NCAR

For example, to find Document RJ0328, go to:
http://dss.ucar.edu/docs/papers-scanned/papers.html

23. Conclusions

The reanalysis observations for 1948 – 2002 are now quite mature, but there are some additions that are in the category of “should do this.” There are even more components and updates that should be worked on.

Considerable work is now going on to prepare more observations for the 1895 – 1947 period. This usually needs time consuming and costly key entry work. Then a number of QC checks should be applied. A date, location, and elevation needs to be associated with every report to be used in reanalysis.
1. Message from Phil Arkin (Chair) about the following report.

   - The title: Working Group Report on Implementation Plans for the CCSP.

3. Enhance the Global Observations for Reanalysis (by Roy Jenne, Mar 1, 2004, 10 p)
   - I prepared this as input for the main report.

4. Next steps for the reanalysis observation archives (R. Jenne, Feb 6, 2004, 2 p)

   - This also lists 15 documents about raobs and pibals.

6. Documents about observations, history, plans for reanalysis, a list (3 p)


Ready for scan on Jul 29, 2004, doc RJ0366, 129 p

Doc. RJ0366

Roy Jenne
NCAR
July 29, 2004
The Document Project

- Started in April 1999
- Production of scan documents started Mar 2000

**GOALS**
- Gather together many documents
- Write more documents
- Scan them for online use

- Progress on scanning documents (NCAR Data Support)

<table>
<thead>
<tr>
<th>Date</th>
<th>Documents</th>
<th>Total Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/31/2000</td>
<td>Up thru RJ0001</td>
<td>206</td>
</tr>
<tr>
<td>06/28/2001</td>
<td>Up thru RJ0117</td>
<td>8,401</td>
</tr>
<tr>
<td>07/26/2002</td>
<td>Up thru RJ0220</td>
<td>14,414</td>
</tr>
<tr>
<td>06/12/2003</td>
<td>Up thru RJ0287</td>
<td>17,521</td>
</tr>
<tr>
<td>06/10/2004</td>
<td>Up thru RJ0358</td>
<td>20,784</td>
</tr>
<tr>
<td>10/20/2005</td>
<td>Up thru RJ0386</td>
<td>22,374</td>
</tr>
</tbody>
</table>

**Benefits:**
- They are good to brief data users.
- The documents help with education.
- The future work would be much harder without these documents.
Documents for Some Subject Areas

( Nov 2005: Now 386 RJ documents with 22,374 pages )

- Info for Africa
  5 doc.  305 pages

- Reanalysis obs.
  6 doc.  305 p

- World Assessment Studies
  1987 - 1998
  15 doc.  1592 p

- Data in countries
  15 doc.  1592 p

- Satellite Data
  19 doc.  1195 p

- Observing Projects
  ( GATE, F66E, etc)
  7 doc.  349 p

- Paleo climate
  20 doc.  733 p

- Data System Issues
  20 doc.  733 p

- Surface land obs
  12 doc.  290 p

- Data for types of research
  20 doc.  186 p

- Energy - climate
  15 doc.  1116 p

- Early Observations
  9 doc.  490 p

---

Guide To Documents
Doc RJ0297, 72 p
-- See this --

Roy Tenne
Nov 2005
Old Weather Observations for USA, World, ~1870 – 1960

There are already large digital datasets of observations that have been prepared for reanalysis projects and other research.

There is information about the available digital observations.

There is information about projects to prepare more data.

The present upper air observations are mostly for 1948 – on.
- But about 12 in pibals for 1920 – 1970 are also ready to use.
- It should be possible to prepare more upper air temperature data, especially for about 1935 – 1947.
- Old 3 km weather maps were drawn during 1933 – 1939, for N. Hemisphere. But observations coverage at 3 km is not too good. But if sea level pressure and temp data are okay, then these plus pibals should permit reasonable tropospheric analyses.

There is a list of US Weather Bureau surface observations stations, valid 1898.

Ready to scanApr 16, 2004, (95 p), doc RJ0344

Roy Jenne
Apr 14, 2004

Doc RJ0344

RJ0344

``Old Weather Obs``

95 F. Celicia 1231
Slides Used at Reanalysis Meetings

(These have various charts and data coverage info)

RJ0181 Observations for reanalysis, Aug 1999 slides, WCRP-2, ECMWF (41 p)
  ▶ Plus text information in RJ 0357 (44 p)
    - A 21-page text and more

RJ0178 Observations for reanalysis, slides 1999 – 2000 (3 sets) (96 p)
  ▶ Slides for Mar 1999 at ECMWF
  ▶ Ocean aircraft tracks June 1942 (p 44)
  ▶ Slides for Oct 2000 at ECMWF
  ▶ Slides for Nov 2000 US-Russia meeting; NCDC, Asheville


RJ0212 Observations for reanalysis 1946 – 2000, emphasize Africa (55 p)
  ▶ Plot: Acft added from USAF, Navy tapes
  ▶ Coverage plots world raobs and pibals, 1940 – 1998
  ▶ When was data ready? pp 26-27

RJ0366 Texts about the next US reanalysis work, 05/2004 (129 p)
  ▶ A 7 page text on adding observations during 1999 – 2003 (pp 76-82)

Roy Jenne
Mar 9, 2006
Table 1. Info and Data Coverage Plots for Upper Air Data in Reanalysis

1. RJ0170 – Much information and plots, data coverage (63 p)
   - Start years of raobs in S. Hemis (we got most of the data, not all).
   - List of 11 aircraft datasets in reanalysis (p 40).
   - Coverage of cloud wind data (by year and longitude) 1973 – on.
   - Early pibal coverage, plots for 1927, 1929, 1937, 1943 (lots India, etc.), 1954, 1960 & more (p 51, etc.)

2. RJ0167 – Has some added pibal coverage plots (TD52 and TD53 pibals).
   - Includes pibal plots for 1920, 1921. Only a few stations, but Hawaii is there.
   - Data for 1919 – 1971 (main years 1926 – 1970). This has many data coverage plots and tables with counts of reports (RJ0167, RJ0168).

3. Rawinsonde Reports for Reanalysis, Selected Papers (RJ0153, 110 p)
   - And many other documents about rawinsondes.

4. RJ0333 – Quick look coverage plots raobs (1940s – on), Pibals (1920s – on)

5. RJ0099 – Aircraft observations for reanalysis (1947 – 2000), 84 p
   - Includes BOLE and TWEBLE constant level balloons.

6. RJ0056 – Constant level balloon data, 56 p

7. RJ0096 – Selected talks about reanalysis data; slides (seven talks)
   - 238 pages in Doc RJ0096, 97, and 98
   - US military aircraft tracks in 1942 (p 79, 80). And there were weather obs along the routes.


9. Satellite Soundings (RJ0084 & 85, 83 p and 73 p respectively)

10. RJ0088 – Early hand weather maps for reanalysis comparisons, 52 p
    This has samples of upper air maps, not surface. But some surface maps are elsewhere. The maps
    have plotted observations. This shows what data was available to the map analyst. It can be
    compared with inventories and coverage plots of digital data.

11. Documents for land and sea surface observations are elsewhere.

12. RJ0092 – Some main data tasks now in progress (in DSS), Nov 00, 28 p

13. RJ0093 – Plans for Data Support, Oct 00, 50 p

How to find these documents:
http://dss.ucar.edu/docs/papers-scanned/papers.html

RJ0159 – Selected buoy and sea ice information, 91 p

RJ0326 – The COADS ship data project and pubs 1980 – 1990

Obs. for surface of ocean

Roy Jenne
Aug 20, 2003
Rev Apr 2005
Documents about Surface Land Observations
(Summary of documents for world surface observations, with pressure, etc.)

1. Surface synop data coverage plots (RJ0323, 37 p)
2. World surface synop on TD13, from USAF, 100m observations
   ▪ For early years to 1971 (RJO335, 33 p; RJ0323; RB0001)
   ▪ The “Dick Davis” set, based on USAF GTS
4. Some other surface land observations (see the summary)
   ▪ NCEP world surface 1975-2001
   ▪ USAF world surface 1973-1981 (not in reanalysis yet)
   ▪ USA surface observations 1948- on (US48, Alaska, Pacific Islands, Caribbean)
5. USSR surface synop data for 1936-1986 (45 p) (RJ0134, 46 p)
   ▪ 223 stations each 3 or 6 hours
6. Surface observations for Australia, 1939-1984 (~30 p)
   ▪ About 45 stations for 1943-1956 (RJO224, 17 p)
   ▪ Then 280 to 375 stations for 1957-1982
7. University of Wisconsin surface net for Antarctica (RJO182, 74 p)
     ▪ Some stations in Greenland for some years (1987-1998).
8. Early hand weather maps for reanalysis comparisons (RJO088, 52 p)
   ▪ Includes Southern Hemisphere maps for 1958-1972
   ▪ Done 3/13/2001, 13 items and 52 pages (RJO088)
9. USAF hourly sfc data worldwide, 351 stations (RJO112)
   ▪ We could not get this as a separate dataset
   ▪ These often go back to the 1930s
10. Data for Brazil 1990 (RJO216, 53 p)
11. World surface pressure data; obs and grids (RJO356, 62 p)
12. US sfc obs 1880-1910, Plate NW USA and Alaska
13. Rough and prepare more old obs (RJO269, 28 p)
14. World surface pressure data, obs & grids (RJO356, 62 p)
15. Surface synop obs for India 100 years (RJO383, 13 p)

Roy Jenne
22 Oct 2001
Rev Apr 2005
Valid Apr 2006
Make New Analyses for the Arctic, Analysis Methods

- Slides presented Nov 2001 at Arctic meeting in Seattle.
- Making new analyses for Arctic surface and upper air.
- Define the 3D-Var and 4D-Var methods.
- Help Arctic analyses for older years.
- Rawinsonde stations north of 60° North, an inventory.
- Ready to scan Apr 15, 2004 (13 p), doc RJ0345

- Document RJ0345 -

Roy Jenne
April 15, 2004
A Few Documents That May Help

1) Reanalysis:
   a. History of reanalysis (RJ0349, May 2004, 149 p)
   b. More work on observations, 1999 – 2003 (RJ0328, 109 p)

2) Quick view of coverage of observations
   b. Coverage raobs and pibals (RJ0212, 55 p, has plots)

3) About older observations (1870 – 1950)
   a. Old weather obs USA, world, 1870 – 1960 (RJ0344, 95 p)
   b. Early met obs in US, 1818 – on (RJ0282, 23 p)

4) Natural climate fluctuations
   a. Some key climate studies (mostly 3 to 30 yr changes) (RJ0354, 54 p)
   b. World temp changes, a few thousand yrs (RJ0322, 93 p)
   c. Past climate of earth: ice ages and more (RJ0108, 72 p)

5) Guide to all the documents (This will be updated soon)
   a. See document RJ0297, 72 p

6) Energy
   a. The world will need more energy 1900-2030 (RJ0308, 28 p)
   b. US energy use, 1950 – 2020 (RJ0321, 11 p)
   c. Econ growth, energy supply & climate change (RJ0012 &13, 150 p)

Motion weather films on a DVD, doc RJ0327, 9 p

To find documents: [http://dss.ucar.edu/docs/papers-scanned/papers.html](http://dss.ucar.edu/docs/papers-scanned/papers.html)

Data Support home page on web: [http://dss.ucar.edu/](http://dss.ucar.edu/)

Roy Jenne
June 9, 2004
NCAR
Rev dept, 2004
Handouts - Reanalysis Info

1. Polar study starts 2007
2. Some Reanalysis tasks to consider
3. Two big projects to prepare obs data
4. Map: Start year of raobs in So. Hemisphere
5. Early data in Russia & USA for Arctic Areas
6. USice obs 1880-1919
   - Plots for NW US & Alaska
7. GALE and Erica, two CD-ROMs
8. Temp plot from NCEP/NCAR reanalysis
9. A US SLP weather map in 1873
10. History US Arctic drifting stations (1950s, 1960s)
11. World Temp change plot from MSU-TOVS
    for 12/1978 - 12/2005 (27 years)
12. S. Harms: Early grid and maps, a figure
13. Chart: Glacier advance and retreat
    - for 7000 years

Roy Tanne
April 5, 2006
NCAR
CU raises awareness for Antarctic research

By Dylan Steele 3-23-06

For the Camera

When University of Colorado Professor John Behrendt went to Antarctica on a research mission 50 years ago, the trip was daunting and the experience humbling.

"The research back then came at a very grave price," said Behrendt, who saw colleagues perish in plane crashes across the frozen continent during "Operation Deep Freeze," which lasted from 1956 to 1968.

Behrendt, who has visited Antarctica 13 times spanning six decades, spoke alongside fellow CU professors and researchers from the local community Wednesday to build awareness for the fourth International Polar Year, a program searching for answers to many of the same questions Behrendt asked a half-century ago.

The IPY, a global research project beginning in March 2007, will combine the effort of more than 30,000 participants from 60 different countries to learn more about the role the polar regions play in global processes like rising sea levels and global warming.

"The IPY program is driven by cooperation, and it brings people from around the world together," said Konrad Steffen, director of the Cooperative Institute for Research in Environmental Sciences overseen by CU and the National Oceanic and Atmospheric Administration.

Both CIRES and the National Snow and Ice Data Center, which is based in Boulder, plan to participate in IPY by contributing research and managing a portion of the massive amounts of data the program is expected to produce.

The fourth IPY will fall 125 years after researchers undertook the initial project in 1882 and 1883, and will last two years so that researchers can gather two full seasons worth of data. They'll be revisiting some of the same issues raised in the first IPY but with more advanced tools and techniques, speakers said.

"It's amazing how much we've learned, but it's also amazing how much we still don't know," said James White, a professor at CU's Institute of Arctic and Alpine Research. "Hopefully, the fourth IPY will leave an important legacy to the next generation of polar researchers."

University of Colorado professor John Behrendt stands in front of the National Science Foundation research vessel Nathaniel B. Palmer in 2003.

March 23, 2006

Daily Camera

Boulder, Colo
Some Reanalysis Tasks to Consider

Roy Jenne
Mar 24, 2006
Rev Apr 18, 2006

This text was prepared to list data projects and tests to consider for the next big global reanalysis projects. The information in item 16 (constant level balloons) was added Apr 18.

1. **The overlap period of sounders**
   - Another test of TOVS vs VTPR
     (Overlap data 11/1978 – 02/1979)
   - Test of SCR vs VTPR analyses
     (Overlap data in 1973)

2. **Can we get good sounder help for 04/1969 thru 11/1972 (3.6 more years)?**
   - NCAR has SIRS; ECMWF got a copy, still there?
   - Consider SIRS, SCR, and IRIS

3. **Prepare cloud winds from geosynchronous satellite for 1967 – 72**
   - For the Americas sector
   - The first launch was 12/1966
   - Archives of 10-inch pix for 1967 – 1972 (at U of Wisc)
     - Try to make winds from the pictures.
     - And also make a motion film (for QC & education)
   - JT Young had pictures scanned about 2000 (now retired).
   - U of Wisc agreed to try this task about 2001. Experts still there?

4. **Recalculate cloud winds from US GOES**
   - Do for late 1978 – on (digital data are available)
   - Correct the slow bias of nearly 1 m/sec
   - And get more and better winds with later methods.
   - Wisc was willing and able to do this in year 2001
     - Now part of the team is gone (still work?)

5. **Cloud winds for Polar areas (11/1978 – on)**
   - Calculate from NOAA polar orbiter data (4 km GAC)
   - Input data now for 27.5 years (now 04/2006).
6. Remember the two recent big climate shifts
   • In 1945 and in 1976
   • I hope the new analyses for several years before and after the shift will be especially good.

7. Do some tests in Mid-East of raob height bias by year-month, based on 12-hr forecast vs each raob.
   • I was told that some raobs were based on the wrong elevation. And this also affected the analysis winds. Probably information valid 20 years ago.

8. Analysis methods for observations present but sparse
   • Experiments with 4D-Var.
   • Perhaps work to get more bogus help from old daily weather maps.
   • Use info from time series obs work to decrease the likely error of the obs.

9. Consider preparing some daily SLP and Z500 bogus help for 1959 thru 1972 (or until adequate sounders exist, maybe 04/1969). For S. Hemis. 30-70 S.
   • There is a quicker, less costly option to digitize part of maps.
   • There is a very costly option (don’t think needed)
   • Use daily maps from S. Africa (1979 – 04/1984) and then Australia.
   **Note:** We have digital grids for SH for 07/1957 – 12/1958, and more.

    • All input library sources have had problems.
      - But many have also been very helpful.
    • Time series library checks are very helpful.
      - These will show real stn changes, false changes, & wrong time for changes.
    • A wrong library will give good obs data at a wrong location.
    • I think the reanalysis library at NCAR is most advanced, but not yet near perfect.

11. Make UA raob inventory plots for all remote stations (time series).
    • In * format, compact print
• Also in obs/mo print, digital browse.
• This will show some data gaps. Maybe some can be filled.

12. Try to get some more of the missing observations.
• In many areas and regions, we have enough observations.
• Only do work that will really help, and not introduce new errors.
• Be careful not to merge in datasets that will introduce the old errors, or bring in new errors.

13. Put in the several Pacific Profilers
• From NOAA Boulder, data mostly at NCAR.

14. Daily snow grids for input (depth, water, fresh snow)
• Weekly grids of snow cover start Nov 1966.
• Option to prepare daily grids from sfc synop obs (RJ0285)
• What is present status of what is used?

15. Make a list of data to add for the Arctic
• COADS now has more data for old years and it had an important fix about 2002 for recent years (date wrong on some 3-hr buoy data).

16. Constant level balloons over S. Hemisphere (see RJ0099)
• EOLE balloons over S. Hemisphere (08/1971 – 12/1972)
  – NCAR has an archive of the balloon locations, from France. Winds can be derived. Not used in reanalysis yet. This would help a data-poor time period. France once derived winds, but they were not archived.
• TWERLE balloons over S. Hemisphere (06/75 – 08/1976)
  – This data has been used in reanalysis. TWERLE balloons even had an accurate altimeter. So data has temp, pressure, height to ocean surface, and people derived winds. A somewhat higher count of data could have been used. Did the analysis methods make full use of the data? Someone should check analyzed level P, T, Z with the reported balloon data.

17. Prepare yr-mo, local, verification scores
• First guess vs analysis, RMS diff, Z, T, on 2.5° grid points, by month, or season, each year.
• First guess vs raobs, at 4 or 5 levels.
18. Help studies of storms and processes
   If we can insert the proper observations, the new reanalysis projects can give good analyses of the storm cases. Consider 3 projects:
   • GATE OBS (06-09/1974), the proper observations are in the reanalysis observations data. Location: On Atlantic Ocean, near Dakar, Senegal.
   • GALE (01-03/1986), need to insert some observations data.
   • ERICA (12/88-2/89), need to insert some observations data.
   NOTE: Data for GALE and ERICA are each on a CD-ROM (Doc RJ0107).

19. Prepare a limited dataset for climate change comparisons
   • Yr-mo data from MSU data teams (on 2.5° grid).
   • Similar yr-mo data from long reanalysis projects. Include 850-300 thickness temp and temp at 850, 700, 500, 300, 50.
   • Some global and sector means.

20. Avoid work that brings back observations errors into reanalysis observations
   • Some types of data merges are dangerous.
   • By Apr 2006, some of this problem was already happening. It can still be fixed.

21. The large component datasets need to be available, not just the final global merges
   • Why? The merge methods keep improving.
   • Tests of the overlap between components were needed to discover and remove errors.
   • This helps us to avoid merging old errors back into reanalysis.

22. Data management principles to have good archives 50 years from now (2006), thus year 2056
   • All hardware and software changes in 15 to 30 years.
   • Must manage complexity to permit data survival.
   • Follow the rules that permit good data access 50 years from now.

NOTE: A copy of this was given to the British Antarctic Survey (on Apr 10, 2006), ECMWF (on Apr 12, 2006), and to Siegfried Schubert, NASA (later).
Options for More Data for So. Hemisphere (Summary) (for Reanalysis)

1. We now are using two sets of satellite data.

2. Some satellite data to consider adding.
   c. Use polar cloud winds (1979 – on). But would this help?

3. Use present old hand-made weather grids for bogus?? There are no sounders then. This would likely help.

4. Perhaps digitize some other maps.
   a. For SLP and 500 mb, 1959 to the sounder age.

5. Try to fill 3 years of raob gaps for So. Africa (parts of 1956 – 63)

6. Obtain more sfc synop (have obs for 1967 – on).
   b. Get South Africa, hope 1955 – on (or more).
   c. Get Brazil, maybe 1915 – on.

7. Do special work on remote raobs.
   a. Look for 1-month gaps that might be filled.
   b. Do time series data checks (set special flags).

8. Use EOLE constant level balloons for 08/1971 – 12/1972
   NCAR has the data for balloon locations
   Someone needs to use this to calculate winds. The level is near 150 mb.

Roy Jenne
Apr 9, 2006

Page 4 of 6
Two Big Projects to Prepare Obs Data

Roy Jenne
Mar 2006

1. The CARDS project (at Asheville, NCDC)
   - Technical methods too complex, caused trouble
     - Deputy Chief of NCDC agreed with this.
   - Not enough diagnostics to find the problems in component datasets.
   - NCDC and Russia worked together on CARDS and derived products from CARDS.
   - As of 2001 still showed data for a number of rawinsonde stations that did not exist.
   - Status Oct 2005: NCDC still keeps CARDS but they have not given it out for 2 or 3 years.

2. Prepare reanalysis observations data (at Data Support, NCAR)
   - Goal: Make available all types of obs needed for reanalysis (rawinsondes, pibals, aircraft,
     satellite sounders, satellite cloud winds, surface obs w/pressure, T, etc., ocean sfc obs—ships,
     buoys, sfc XBT/name ICOADS). The big seven types of obs.
   - Work started in 1990 – 91, based on world obs gathering that started in 1966.
   - The first reanalysis production started 06/1994 at both NCEP (NMC) and ECMWF. NCAR
     kept preparing obs in 7 to 10-year batches going back in time. The last batch for 1948 – 57
     was sent in Mar 1998. And NCEP finished 50 years of 4x/day analyses in July 1998 (data
     1948 thru 1997). Now (04/2006) there are 58.3 yrs of NCEP/NCAR analyses.
     - NASA Goddard got the same reanalysis obs data from NCEP to do the more recent years.
     - ECMWF got the same obs from NCEP for ERA-40 and used some other data they got.
   - NCAR did many diagnostics on the component datasets and added more tests when problems
     got worse.
   - We did massive comparisons of actual data values between several large component sets of
     raobs. This uncovered several problems including some stations with wrong wind units in
     one set. The time overlap between the components is valuable. It gets thrown away in a
     merge.
   - The reanalysis datasets of observations are now getting rather mature. These obs have been
     through several big reanalysis production runs at NCEP and ECMWF. The QC at the centers
     uncovered some more problems that were fixed.
   - The philosophy was to handle the systematic data errors at NCAR plus a few of the random
     errors. Most of the random errors were left for NCEP and ECMWF to handle.

3. The work split at Asheville (NCDC and USAF) in earlier years
NCDC prepared US sfc and upper air data. They also gathered raob data on cards from Canada
starting 1955. And gradually the US Control raob tapes started showing a little more of the
foreign data.

The USAF did most of the huge amount of work to prepare foreign sfc and UA data. Sfc set
TD13 starts about 1920, has 100,000,000 obs. Each observation was put on a punched card.
Pibal data mainly started about 1920 (TD52 and TD53). They prepared several decks of
rawinsonde data: TD54, etc., for about 1947 – 1971. Lots more punched cards. The USAF
efforts to key enter obs ended with data for about 1971. They were moving to input the
observations from GTS directly to tape. Makes sense.
The source of USAF GTS obs data on tape was mainly Offutt AFB for many years, near Omaha. I was stationed at Offutt during 1960 – 64. By Oct 1960, we had very good streams of world sfc and UA data (especially N. Hemisphere) coming in and put on tapes. The UA included raobs, pibals, and aircraft. I would sure like to have an archive of that data now. We (USAF) got about 100 more raob stations on prime times (0 and 12 Z) than did NMC. Better telecom. Our (NCAR) early archives of upper air data (raobs, pibals, aircraft) from GTS for reanalysis are from NMC and start March 1962.

4. Hemispheric maps and data lists
The USAF had a project to draw sfc and 500 mb daily N. Hemisphere maps for 1946 – 48. The monthly documents included listings of sfc and UA observations (not aircraft) for the hemisphere. It is good small print and OCR might work. I suspect that many of the same obs did get into TD13 or TD54, etc. But I think this coverage is better. It has Canada raobs for early years—not in TD54.

This project was taken over by the US Weather Bureau, starting with maps and publications for Jan 1949.

> The monthly publications of daily hemispheric weather maps also had listings of observations, surface and upper air.

5. Ability to access the archive data at Asheville
About 1970, Asheville had data on about 600,000,000 punched cards. The card boxes were stacked in hallways, etc. To buy raob data for a few stations cost $4.50 per 1000 cards. Asheville started the huge task of moving cards to tape. A full tape (half-inch, 2400 ft, 12-inch data) held only about 10 to 12 Mbytes then.

By about 1977 – 78, the cards had been moved to tapes, then there were large numbers of tapes. It started to get practical to transfer large amounts of obs data to another place. But still the costs were high.

6. The USAF (Asheville) maintains “Datav” archives of world surface and upper air data, in separate archives, based on GTS input, 1973-on. This does not include aircraft or satellite data. For some years they have aircraft in a separate archive.

7. The Navy also has archives of GTS data that start in 1966, or a better start in 1971. Part of this was used for reanalysis.

8. Integrated global radiosonde archive (rawinsondes and pibals)
This dataset is a rather recent offering from NCDC, Asheville (advertised about 01/2006). It has 28 million soundings with a total of 800 million levels. And 82% of the soundings originate from the GTS-based data sources listed below. About 20m of the 28m soundings have temperature data; the rest are winds only (often called pibals). See: www.ncdc.noaa.gov/oa/cab/igra/index.php?name=coverage

Table 1 is on next page
### Table 1: Data Sources for IGRA

<table>
<thead>
<tr>
<th>Item</th>
<th>Data Source</th>
<th>Period of Record</th>
<th>Area of Coverage</th>
<th>Number of Stations</th>
<th>Percent of IGRA Soundings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NCDC Historical GTS</td>
<td>1963-1970</td>
<td>Global</td>
<td>820</td>
<td>7.94</td>
</tr>
<tr>
<td>2</td>
<td>NCAR/NCEP GTS</td>
<td>1970-1972</td>
<td>Global</td>
<td>848</td>
<td>3.01</td>
</tr>
<tr>
<td>3</td>
<td>NCEP GTS</td>
<td>1973-1999</td>
<td>Global</td>
<td>1517</td>
<td>64.06</td>
</tr>
<tr>
<td>4</td>
<td>NCDC Real-Time GTS</td>
<td>2000-present</td>
<td>Global</td>
<td>1093</td>
<td>7.13</td>
</tr>
<tr>
<td>5</td>
<td>Russian GTS</td>
<td>1998-2001</td>
<td>Global</td>
<td>923</td>
<td>1.59</td>
</tr>
<tr>
<td>7</td>
<td>Australian GTS</td>
<td>1990-1993</td>
<td>Southern Hemisphere</td>
<td>170</td>
<td>0.15</td>
</tr>
<tr>
<td>9</td>
<td>Australian</td>
<td>1938-1989</td>
<td>Australia &amp; territories</td>
<td>17</td>
<td>1.63</td>
</tr>
<tr>
<td>10</td>
<td>Argentine</td>
<td>1958-1991</td>
<td>Argentina</td>
<td>8</td>
<td>0.18</td>
</tr>
<tr>
<td>11</td>
<td>South Korean</td>
<td>1984-1992</td>
<td>South Korea</td>
<td>4</td>
<td>0.01</td>
</tr>
</tbody>
</table>

#### Notes to Compare Table 1 with Reanalysis Observations

1. The original tapes of NMC (NCEP) UA obs for 03/1962–12/1972 came to NCAR (raobs, pibals, acft, cloud wind, etc.) This should include items 1 and 2. We gave item 2 to NCDC. All used for reanalysis. There were about 20-40 cases (1962 – 72) where data for a global 12-hour time period was given and the same data was also given again, but with wrong data time (usually 12-hrs wrong, but sometimes much bigger). About 1995, Dick Davis (NCDC) said that he seemed to remember that NCDC had also seen some of this problem. The reanalysis data was fixed before using it. Also, recent reanalyses include GTS data from both NCEP and ECMWF for about 1980–on.

2. NCAR used NCEP GTS (1973 – on), including the raobs, pibals, acft, cloud winds.

3. NCDC used NCEP GTS (1973 – on), including the raobs, pibals, acft, cloud winds.

4. NCDC GTS: Reanalysis doesn’t have this (it should be covered). Reanalysis will have ECMWF GTS for about 1980 – on, and parts of Navy and USAF GTS. Being used.

5. Russian GTS: Reanalysis doesn’t have. Should be mostly in NCEP GTS or another GTS.

6. US Air force 1946 – 1973: We should have this in reanalysis. But I can’t tell what the components of this are.

7. Australian GTS 1990 – 1993: Not in reanalysis. But I guess that all of these observations are in reanalysis from NCEP, and our other GTS sources.

8. US: We did include the “US Control” data in reanalysis. Errors for 120 stn-yrs were removed. Also the winds for US stations have a slow bias (.5 m/sec) during about 1970 – 1991 (truncated, not rounded).

9. Australia: We also used this (last year 1987). NCEP GTS has the later years.

10. Argentina: We used this 1958 – 1991.


- Roy Panne, Revised Apr 20, 2006
What year did ravishordes (mainly) start in So. Hemisphere?

Figure 2

The year (19xx) when UA obs. started in S. Hemisphere.


Note: Some digital data still missing
Early Data in Russia and USA for Arctic Areas

Roy Jenne
Feb 10, 2006

1. Doc RJ0346 (11 p). This has information about when sfc stations started in NW US-48 and in Alaska. There was one station for Alaska (Sitka) by 1881 and 5 by 1909. Three pages with maps are attached with much of this information.

   - Alaska has 9 sfc stations in 1920, plus 7 in NW Canada (p 13).
   - Comments on sfc station coverage on old synop maps (p 8).
   - Sfc data for USSR, 1880-2000 (p 30-31). The US paid to help them copy many, many tapes of full obs. At first I think Gus Shumbera only got a few elements. Now I think you have more like whole observations at NCDC.
   - TD52 & 53 pibal receipts (p 47).
   - Early UA data for Russia, not digitized (p 35-43).
     - From Alex Sterin (WDC-B)
     - We should concentrate on years before 1950.
     - Probably a separate contract for RIHMI.
   - Film reels of US upper air at NCDC (about 34 reels).
     Includes US raobs for about 1937-48 and some earlier thermal data.
     - US UA data (a sheet from Gus Shumbera) p 49-50
     - Film reels US raobs. Notes by Jenne, p 51-53
     - Film inventory charts from NCDC
     - Looks like about 10 or 11 Alaskan raob stations operating in 1942-43 and some of these in 1939-40. I do not see Adak? Did Japan have it then?

3. RJ0282 (23 p). Early meteorological observations in the US
   - The US observations net 1818 to 1938.
   - On 2 trips to Asheville (Oct 1999 and Nov 2000), I spent about 13 hours in library to gather this information.
   - This is a summary; much of the basic information and tables is in RJ0082 and RJ0083 (83 plus 82 pages).

4. Rawinsonde stations for far north Canada
   There were 5 or 6 rawinsonde stations for far north Canada by 1948. These were started for defense reasons and I think that the US paid for them then. The observations are available. Also, raobs started for Thule, Greenland, before 1948.

5. How to find online documents:
   [http://dss.ucar.edu/docs/papers-scanned/papers.html](http://dss.ucar.edu/docs/papers-scanned/papers.html)

- A list from the US Weather Bureau in 1910 shows when each station started.
  - A similar station list dated 1898 is in Document RJ0344.

- There were 5 stations in Alaska in 1910. A plot shows the location and starting year of observations.

- This includes a short history of US and World surface observing networks.

- NCDC is digitizing hourly US data for 1928-1948 (about 130 stations), and 2x daily observations for 1895-1928 (being done during 2002-2004).

- Also see plotted hemispheric weather maps for 1899, 1910, and 1920. In another document (RJ0344).

- Ready to scan April 16, 2004 (11p), Doc RJ0346.

Roy Jenne
April 22, 2004
US Weather Bureau Surface Observing Stations in 1910

A list of US surface weather stations is given, valid 1910. It shows the starting dates of the stations. There are 221 stations in the list. The stations measured pressure, temperature, wind, etc. (from the Handbook of Applied Meteorology, 1985). Observations for many of these US stations started in the 1870’s.

A few stations in the list (with starting dates) are given:

<table>
<thead>
<tr>
<th>Locations</th>
<th>Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td></td>
</tr>
<tr>
<td>Nome</td>
<td>64.5 N, 165.3 W</td>
</tr>
<tr>
<td>Tanana</td>
<td>65.2 N, 152.0 W</td>
</tr>
<tr>
<td>Valdez</td>
<td>61.1 N, 146.1 W</td>
</tr>
<tr>
<td>Eagle</td>
<td>64.8 N, 141.1 W</td>
</tr>
<tr>
<td>Sitka</td>
<td>57.0 N, 135.3 W</td>
</tr>
<tr>
<td>Northwest USA</td>
<td></td>
</tr>
<tr>
<td>Blain, WA</td>
<td>49.0 N, 122.7 W</td>
</tr>
<tr>
<td>Lewiston, ID</td>
<td>46.4 N, 117.0 W</td>
</tr>
<tr>
<td>Missoula, MT</td>
<td>46.8 N, 114.0 W</td>
</tr>
<tr>
<td>North Head</td>
<td>46.2 N, 124.0 W</td>
</tr>
<tr>
<td>North Yakima</td>
<td>46.6 N, 120.6 W</td>
</tr>
<tr>
<td>Portland, OR</td>
<td>45.5 N, 122.6 W</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>47.6 N, 122.3 W</td>
</tr>
<tr>
<td>Spokane, WA</td>
<td>47.7 N, 117.5 W</td>
</tr>
<tr>
<td>Tacoma, WA</td>
<td>47.3 N, 122.3 W</td>
</tr>
<tr>
<td>Tatoosh, WA</td>
<td>48.3 N, 124.7 W</td>
</tr>
<tr>
<td>Walla Walla, WA</td>
<td>46.0 N, 118.3 W</td>
</tr>
</tbody>
</table>

Note: hourly data for about 300 US stations have been digitized, starting with year 1948. Digital data for US pressure, weather, wind, etc. are not available for 1880-1947. It would help a lot to have a digital record of these data for 3 to 8 observations per day.

— Roy Jenne

NCDC has already digitized most of these.

Roy Jenne
April 2006
Early weather stations in Alaska

Some early weather stations (Press, wind etc.)

North west USA
GALE and ERICA, Two CD-ROMs

Roy Jenne
Dec 1998

GALE Dataset CD-ROM
1/15/86 – 3/15/86
Made by Department of Atmospheric Sciences, University of Washington
(Surface, upper air, and aircraft data)

ERICA CD-ROM
12/1/88 – 2/28/89
Made by ERICA Data Center, Department of Physics and Atmospheric Sciences, Drexel University
(Surface, upper air, and aircraft data)

Interested in:  
  a. ship raobs  
  b. dropsondes  
  c. aircraft flight level data  
  d. surface 3-hr data
Some Large Reanalysis Projects

1. NCAR: Assemble observations
   Main work: Feb 1991 – 1999

2. NCEP/NCAR: 50 year reanalysis (1948 – 1997)
   a. Last model update Aug 1994
   c. A DOE person called this “the mother of all reanalyses”
      - Finish 17 years in Feb 1996 (1979 – 95)
      - Finish 40 years in Oct 1997 (1957 – 97)
      - Finish all 50 years in Jul 1998 (1948 – 97)

2.1 NCEP is doing 1979 – 97 again, with many model changes.
   They are using a DOE computer.
   a. Last model update May 1998
   b. May 7, 1998: Production on Jan 1979 starts
      - Nov 24, 1998: Now doing Apr 1986
      - Feb 22, 1999: Now doing Dec 1988

2.2 Plans for a new long reanalysis (1948 – 2004)
   - Probably start production Jan 2003

3. Reanalysis by ECMWF
   3.1 ERA-15: ECMWF finished 15 years (1979 – 93)
      a. The total operation period was Jun 1994 – Sep 1996
      b. The date of the last model change was about Nov 1994

3.2 Plans for ERA-40: Do the years 1957 – 2000
   a. Last model change about Aug 1999
   b. Probably start production about Sep 1999

4. NASA Goddard
   Finish 16 years (1980 – 95) in 1997

Roy Jenne
2 Mar 1999
Tropospheric temperature
(NCEP/NCAR reanalysis)
1948 - 2003

NCEP/NCAR Reanalysis - Annual Means, 25S - 90N
850-300mb Thickness Temperatures

This plot of thickness temps for tropics plus N Hem. is very similar to the one for 500 mb temps. More plots in RJ0364 - R Greene

July 2003
REPORT OF THE SECRETARY OF WAR.

List of Stations in 1873

to be received at station No. — are underlined in red ink, and any failure to receive them must be promptly reported to this office, with a statement of the probable cause of failure.

<table>
<thead>
<tr>
<th>Station</th>
<th>No.</th>
<th>Station</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Breton, Can.</td>
<td>1</td>
<td>Breslau, Iowa</td>
<td>51</td>
</tr>
<tr>
<td>Chatham, N.Y.</td>
<td>2</td>
<td>Leipzig, Kansas</td>
<td>52</td>
</tr>
<tr>
<td>Santiago de Cuba</td>
<td>3</td>
<td>Cairo, III</td>
<td>53</td>
</tr>
<tr>
<td>Sydney, C. B.</td>
<td>4</td>
<td>Cape May, III</td>
<td>54</td>
</tr>
<tr>
<td>Sydney Point, Can.</td>
<td>5</td>
<td>Galveston, Tex</td>
<td>55</td>
</tr>
<tr>
<td>Beaufort, Char.</td>
<td>6</td>
<td>Montreal, Canada</td>
<td>56</td>
</tr>
<tr>
<td>Daintree, Galapagos</td>
<td>7</td>
<td>Quebec, Canada</td>
<td>57</td>
</tr>
<tr>
<td>Flinders Cove, N.B.</td>
<td>8</td>
<td>Toronto, Canada</td>
<td>58</td>
</tr>
<tr>
<td>New York, Conn.</td>
<td>9</td>
<td>Pemaquid, Maine</td>
<td>59</td>
</tr>
<tr>
<td>Pemaquid, Maine</td>
<td>10</td>
<td>Wood's Hole, Mass</td>
<td>60</td>
</tr>
<tr>
<td>Portland, Me.</td>
<td>11</td>
<td>Vicksburg, Miss</td>
<td>61</td>
</tr>
<tr>
<td>Memphis, Tenn.</td>
<td>12</td>
<td>New Orleans, La.</td>
<td>62</td>
</tr>
<tr>
<td>Nashville, Tenn.</td>
<td>13</td>
<td>New Orleans, La.</td>
<td>63</td>
</tr>
<tr>
<td>Cincinnati, Ohio</td>
<td>14</td>
<td>Louisville, Ky.</td>
<td>64</td>
</tr>
<tr>
<td>Saint Louis, Mo.</td>
<td>15</td>
<td>Ky.</td>
<td>65</td>
</tr>
<tr>
<td>Lyons, N.Y.</td>
<td>16</td>
<td>Montgomery, Ala.</td>
<td>66</td>
</tr>
<tr>
<td>Manchester, N.H.</td>
<td>17</td>
<td>Baltimore, Md.</td>
<td>67</td>
</tr>
<tr>
<td>New Haven, Conn.</td>
<td>18</td>
<td>Santa Fe, N. Mex.</td>
<td>68</td>
</tr>
<tr>
<td>Topeka, Kan.</td>
<td>19</td>
<td>Carson, Utah</td>
<td>69</td>
</tr>
<tr>
<td>Fort Benton, Mont.</td>
<td>20</td>
<td>San Francisco Cal.</td>
<td>70</td>
</tr>
<tr>
<td>Reno, Colo.</td>
<td>21</td>
<td>Denver, Colo.</td>
<td>71</td>
</tr>
<tr>
<td>Portage, Ont.</td>
<td>22</td>
<td>Virginia City, Mo.</td>
<td>72</td>
</tr>
<tr>
<td>Port Stanley, Can.</td>
<td>23</td>
<td>Fort Derington, Can.</td>
<td>73</td>
</tr>
<tr>
<td>Fort Delight, Can.</td>
<td>24</td>
<td>Kingston, Canada</td>
<td>74</td>
</tr>
<tr>
<td>Fort Durand, Can.</td>
<td>25</td>
<td>Saugeen, Canada</td>
<td>75</td>
</tr>
<tr>
<td>Rockford, Ill.</td>
<td>26</td>
<td>Breckinridge, Minn</td>
<td>76</td>
</tr>
<tr>
<td>Fort St. Mary, B.C.</td>
<td>27</td>
<td>Fort Smith, B.C.</td>
<td>77</td>
</tr>
<tr>
<td>Fort59, Alberta</td>
<td>28</td>
<td>Fort Garry, Manitoba</td>
<td>78</td>
</tr>
<tr>
<td>Fort Leavenworth, Kan.</td>
<td>29</td>
<td>Lexington, Ky.</td>
<td>79</td>
</tr>
<tr>
<td>Fort80, Iowa</td>
<td>30</td>
<td>Fort81, Iowa</td>
<td>80</td>
</tr>
<tr>
<td>Fort82, Iowa</td>
<td>31</td>
<td>Fort83, Iowa</td>
<td>81</td>
</tr>
<tr>
<td>Fort84, Iowa</td>
<td>32</td>
<td>Fort85, Iowa</td>
<td>82</td>
</tr>
<tr>
<td>Fort86, Iowa</td>
<td>33</td>
<td>Fort87, Iowa</td>
<td>83</td>
</tr>
<tr>
<td>Fort88, Iowa</td>
<td>34</td>
<td>Fort89, Iowa</td>
<td>84</td>
</tr>
<tr>
<td>Fort90, Iowa</td>
<td>35</td>
<td>Fort91, Iowa</td>
<td>85</td>
</tr>
<tr>
<td>Fort92, Iowa</td>
<td>36</td>
<td>Fort93, Iowa</td>
<td>86</td>
</tr>
<tr>
<td>Fort94, Iowa</td>
<td>37</td>
<td>Fort95, Iowa</td>
<td>87</td>
</tr>
<tr>
<td>Fort96, Iowa</td>
<td>38</td>
<td>Fort97, Iowa</td>
<td>88</td>
</tr>
<tr>
<td>Fort98, Iowa</td>
<td>39</td>
<td>Fort99, Iowa</td>
<td>89</td>
</tr>
<tr>
<td>Fort100, Iowa</td>
<td>40</td>
<td>Fort101, Iowa</td>
<td>90</td>
</tr>
<tr>
<td>Fort102, Iowa</td>
<td>41</td>
<td>Fort103, Iowa</td>
<td>91</td>
</tr>
<tr>
<td>Fort104, Iowa</td>
<td>42</td>
<td>Fort105, Iowa</td>
<td>92</td>
</tr>
<tr>
<td>Fort106, Iowa</td>
<td>43</td>
<td>Fort107, Iowa</td>
<td>93</td>
</tr>
<tr>
<td>Fort108, Iowa</td>
<td>44</td>
<td>Fort109, Iowa</td>
<td>94</td>
</tr>
<tr>
<td>Fort110, Iowa</td>
<td>45</td>
<td>Fort111, Iowa</td>
<td>95</td>
</tr>
<tr>
<td>Fort112, Iowa</td>
<td>46</td>
<td>Fort113, Iowa</td>
<td>96</td>
</tr>
<tr>
<td>Fort114, Iowa</td>
<td>47</td>
<td>Fort115, Iowa</td>
<td>97</td>
</tr>
<tr>
<td>Fort116, Iowa</td>
<td>48</td>
<td>Fort117, Iowa</td>
<td>98</td>
</tr>
<tr>
<td>Fort118, Iowa</td>
<td>49</td>
<td>Fort119, Iowa</td>
<td>99</td>
</tr>
<tr>
<td>Fort120, Iowa</td>
<td>50</td>
<td>Fort121, Iowa</td>
<td>100</td>
</tr>
</tbody>
</table>

10. At each station an observation of the barometer will be taken daily at 12 noon, Washington mean time, and if a change equal to, or greater than, fifteen hundredths of an inch has taken place since the regular morning telegraphic observation, the fact will be reported immediately by telegraph to the Chief Signal-Officer, with the direction and state of the wind in miles per hour, the whole being sent in the same order in which they are given here, and in the regular cipher words. A regular weekly report of these mid-day observations will be made out on Form 4 and mailed to the central office with the other reports on this form.

11. In addition to the daily observations and those made for telegraphic transmission, three others will be taken daily—at 7 a.m., 2 p.m., and 9 p.m. (local time), respectively. These will be recorded upon Form 5 in the same manner as the telegraphic observations, but on a separate sheet, and a copy of them will be forwarded weekly to the office of the Chief Signal-Officer.

12. After delivering his own reports to the operator, each observer or assistant designated by the observer will remain in the telegraph-office until they are sent to their proper destination, and until the reports from other stations intended for use at his station are received, or until assured that their receipt has been prevented by some cause beyond the control of the operators. The reports for station No. — should be received by — a. m., — p. m., and — m., respectively; and when they are delayed more than — hours, the operator shall report to the central office a statement of the case and the time of receiving the reports. The reports for station No. — should be received by — a. m., — p. m., and — m., respectively; and when they are delayed more than — hours, the operator shall report to the central office a statement of the case and the time of receiving the reports.
Introduction

Ancient Times

Age of Exploration

Russian Northern Expeditions

Northwest Passage

Northeast Passage

Jeannette and Greely

Nansen and the Fram

Andrée’s Balloon

Peary & the North Pole

Early Icebreakers

Arctic Ocean Hydro. Expedition

Karluk Disaster

The Maud

Early Aviation

Soviet Exploration

Soviet Drifting Stations

High Latitude Air Expeditions

Thule Air Base & DEW

US Drifting Stations

Submarines Under the Ice

Modern Expeditions

Current Expeditions

History

US Arctic Drifting Stations (1950s-1960s)

While Soviet postwar activities in the Arctic were unknown to the west until 1954, the US Air Force began B-29 reconnaissance flights to the region beginning in 1946. Surprisingly, several large ice masses were spotted in the deep basin, which were later determined to be icebergs which had broken off and drifted from the ancient glacial ice foot of northern Ellesmere Island. By 1951, daily reconnaissance trips to the Pole were being implemented, and the drift of three large ice island targets (T-1, T-2, and T-3) were being tracked. The following year, the Alaska Air Command organized Project ICICLE in order to establish a weather station on one of the ice islands and conduct geophysical research. Joseph O. Fletcher was put in charge of the project, and ice island T-3 was selected as the site.

In March 1952, a C-47 aircraft from Thule Air Base landed on T-3, which was seven miles long and protruded 50 feet above the surrounding icepack, and the station was installed. Insulated huts were flown in sections to the ice island (which was renamed "Fletcher’s Ice Island") and assembled by members of the military. Scientists (led by Alfred P. Crary) arrived soon after and performed numerous scientific investigations including hydrographic measurements, seismic soundings, and meteorological observations. The station was abandoned in May 1954 (when the weather observations were deemed redundant with nearby Canadian weather station Alert) but was reoccupied from April to September 1955.

The International Geophysical Year (IGY) planned for 1957-1958 stimulated interest in the US for occupying two drifting stations in the Arctic. Project ICESKATE (again under the command of Fletcher) was formed to install station ALPHA on a drifting ice floe, and station BRAVO would reoccupy T-3.

In April 1957, the first ski-equipped C-47 landed at 79°N, 159°W in order to install the ALPHA camp. By the end of May, a 1500 m long runway and most of the camp’s 26 Jamesway huts had been

http://www.whoi.edu/beaufortgyre/history/history_usdrift.html
Saw and shovel build a house of snow blocks to shut out icy winds. Image courtesy U.S. Air Force.

completed, and scientific operations commenced. Typically between 25 and 30 military and scientists manned the camp at any time. During April of the following year, the ice floe began to crack, and the camp was moved 2 km away. Drifting generally north then east, ALPHA was visited by the submarine USS Skate in August 1958. Afterwards, the ice began cracking and ridging again so the camp was finally abandoned in November. However, there was still interest in continuing research started at ALPHA, so in April 1959, station CHARLIE (also known as ALPHA II) was established at 75°N, 158°W by the Alaska Air Command, with assistance from the Navy's Arctic Research Laboratory in Barrow, Alaska. Scientific work was conducted from June 1959 until January 1960, when the ice floe cracked, shortening the runway so that CHARLIE had to be evacuated.

Meanwhile, in 1957 the Northeast Air Command established BRAVO on T-3 by bringing in 42-foot long commercial house trailers on C-130s equipped with skis. The reoccupied ice island drifted west off of the north coast of Canada, arriving in Alaska waters by July 1959, where air support responsibilities were transferred to Alaskan bases. In May 1960, the ice island went aground at near Wainwright, Alaska, making study programs ineffective. The following year, in October 1961, it was abandoned again, with the station left intact for possible future use.

The Navy was still eager to continue operations in the Arctic, so as a replacement for CHARLIE, the Arctic Research Laboratory (under Max Brewer) sought to install a drifting station in May 1960, but balked at the costs required to charter a C-47 for the installation. As a result, the following September icebreaker Burton Island was used to transport the equipment to 75°N, 137° W, and the Arctic Research Laboratory Ice Station I (ARLIS I) was constructed in 40 hours with help from the ship's crew. Though intended to support 8 scientists and 4 camp personnel, ARLIS I never achieved a full complement. Small Cessna-180 aircraft were used for resupplying the station as it drifted westward, but upon approaching the range limit of these aircraft, the station was evacuated in March 1961.

For the second Arctic Research Laboratory Ice Station (ARLIS II), a more permanent drifting ice station was desired, but with T-3 grounded, a tentative site on an ice floe was selected. However, during deployment in May 1961, chance resulted in the finding of a 3.5 by 1.5 mile ice island north of Point Barrow at 73°N, 156°W. Using R4Ds (the Navy equivalent of the C-47) and Cessnas, all of the equipment to outfit the 14 prefabricated buildings was transported to the ice island in 22 days. Scientific operations commenced in June 1961, and continued all the way into 1965. Resupply of ARLIS II during the first year was carried out by Cessnas, later by airdrops from Lockheed Lodestars, by the icebreaker Staten Island twice in the summer, and by R4Ds. As the ice island drifted farther north, away from Barrow and across the Arctic
Ocean between 1962 and 1964, resupply from Alaska became a bigger problem involving longer flights, fuel drops, intermediate stops, and sometimes other aircraft from the USAF and RCAF.

While ARLIS II was drifting away from Barrow, T-3 was rediscovered in February 1962 over 100 miles north of where it had been previously grounded. The Arctic Research Laboratory reoccupied the ice island, refurbished the buildings, and the Navy was formally given the station which served as a second drifting station and a fuel depot for the flights to ARLIS II. ARLIS II reached the most northern point of its journey at 88°39'N in December 1963 and eventually drifted out through the Fram Strait with the East Greenland Current, with supply operations now proceeding out of Keflavík Naval Station in Iceland. ARLIS II was evacuated in May 1965 by the icebreaker Edisto after 47 months and 18 days of continuous operation during which it was used by 14 different research projects, including 337 different scientific and support personnel. Upon completion of ARLIS II, a full occupation of T-3 by the Arctic Research Laboratory was initiated in September 1965, which had completely circled the Beaufort Gyre. It remained in continuous use until 1974, was last visited in 1979, and eventually drifted through the Fram Strait in 1983, after being monitored for over 30 years.

In addition, while the ARLIS II and T-3 ice stations were occupied, the Arctic Research Laboratory established two temporary drift stations northeast of Barrow primarily for studies of telluric currents, geomagnetic variation and micropulsations, and aurora. ARLIS III was established in February 1964 and was evacuated in May of the same year, while ARLIS IV operated between February and May of 1965.

References:


Fletcher, J.O., Three months on an Arctic ice island, National Geographic, 103, 489-504, 1953.


Roy, 29 March 2006
Per my e-mail today:
A couple of useful ice station articles,
from a longer WHOI website.

Scott Woodruff, NOAA
found this history.
Global climate change: December 1978 - December 2005

Cumulative effects of regional climate changes from seasonal norms

from: John Christy
on Mar 31 - 2006

Temp trend, MSU, Dec 78 - Dec 2005 (27 years)

Nearly all a big cooling trend in these southern latitudes. Is this okay?

-Roy Jeme

1950

1. Daily S.Hem. SLP by S. Africa
   1950 grids 05/57
   1950

2. IGY grids
   6/57 12/58

3. SLP, 500 mb NOTOS maps
   1959 04/1964
   not grids

4. ~1957
   So. Hem. Maps (not grids)
   Australia (Sfc and 500 mb)

5. 1957
   60-20E Sector
   SLP grids available

Mar 21, 2006
Roy Janne
I need help from glacial experts. How good is the following Fig 4.15 on page 101 of this book? Did they have good dates from many moraines? But some would be destroyed by future ice advances??
Figure 4.15 An analysis of the fluctuations of glaciers in the northern and southern hemispheres during the last 7,600 years, compared with radiocarbon production variations. Periods of negative radiocarbon production signal lower solar activity and are associated with glacial advance, which is a sign of a cooling climate (Burroughs, 1994, Fig. 4.10).

from "Climate Change" by Burroughs

What is more clear is that there were shorter periods of climatic deterioration, which may or may not have coincided with the decline of certain civilisations. The identification of these events, their causes and the question of their historical impact are considered in later chapters. As a general observation, historical records provide relatively little insight. While there are plenty of examples of custom and practice (e.g. the extent of the production of olive oil and wine, the construction of bridges and the design of buildings), which can be used to infer that climate change had a part to play in events, their interpretation is the subject of dispute. Specific references to the weather are available here and there. So for instance a compilation of the examples referring to Italy between around 300 BC and AD 1300 suggest warmer, drier conditions in the third to fifth centuries AD, and again in the eighth and tenth centuries AD, with wetter conditions at other times. But, apart from the occasional tantalising clues like the weather diary of Ptolemy which indicates that between AD 127 and 151 the climate of Alexandria was much wetter than now, the historical
Changes in World Glaciers

1. Most glaciers have retreated since 1820
   The glaciers have been melting for 180 years. They were melting before there was much buildup of greenhouse gases. What has caused this?

   ![Graph showing world glacier retreat](image)
   - 1750-1820 - glaciers steady
   - 1820- - glaciers retreat
   by Oerlemans, Science 29 Apr 2005, P 675-677

2. Glacier history
   - Periods of advance and retreat of glaciers during the past 3000 years.
   - Most of this is a part of natural climate cycles.

   ![Graph showing glacier history](image)