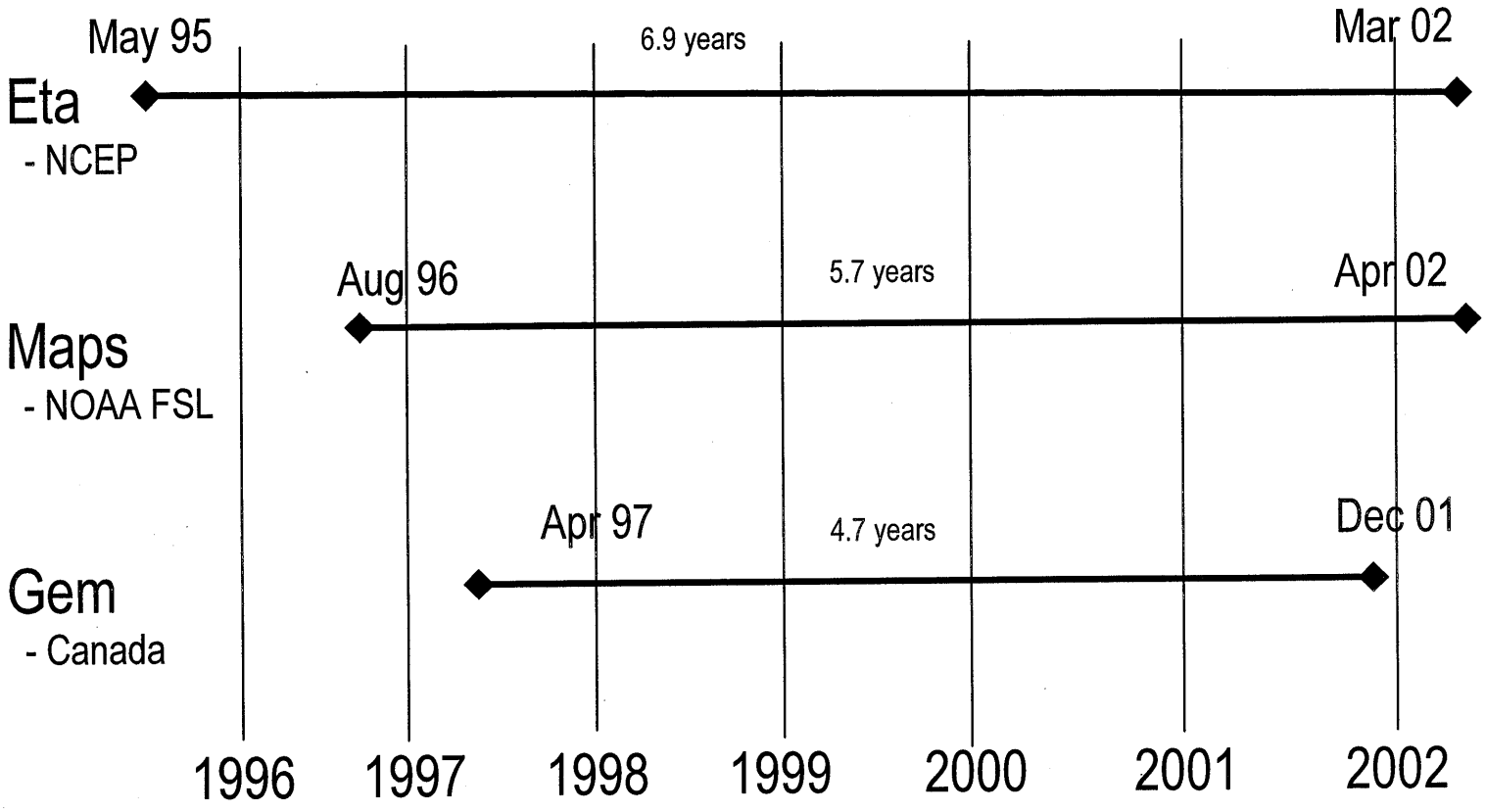
# The Model Data Center for GCIP/GAPP

- Mesoscale model data at NCAR
- Other model data
- User's access to NCAR data
- Global reanalysis (obs and analyses)
- Guide to selected water data

*Roy Jenne*
*May 2002*

For:
Mississippi River Climate and Hydrology Conference
New Orleans, May 13–17, 2002

# Mesoscale Model Data at NCAR




Numbers are from Chi-Fan Shih, NCAR

**Figure 1.** Mesoscale model data for North America held at NCAR as of Apr 2002. The data includes analyses and forecasts. Eta, Maps and Gem have a resolution of about 30 km. We will not obtain any more earlier data from these models. NCAR also has the earlier LFM grids from NCEP (Oct 71 – Dec 93), and the NGM grids for Oct 1984 – present. The archive resolution of LFM and NGM is about 180 km.

Status in Apr 2002

- The volume of this archive is 1049 GB
- During 1998 – 01, we sent 2860 GB

*Roy Jenne*
*May 2002*

# Mesoscale Model Data at NCAR

| Date | Data in Archive (GB) | Cumulative Data Sent to Users |
|---|---|---|
| Jan 2000 | 510 | 450 GB |
| Feb 20, 2001 | 737 | 748 GB |
| Apr 30, 2002 | 1049 | 2860 GB* |

Numbers are from Chi-Fan Shih.

* The big jump during 02/2001 – 04/2002 was caused by a few large orders.

*Roy Jenne*
*May 2002*

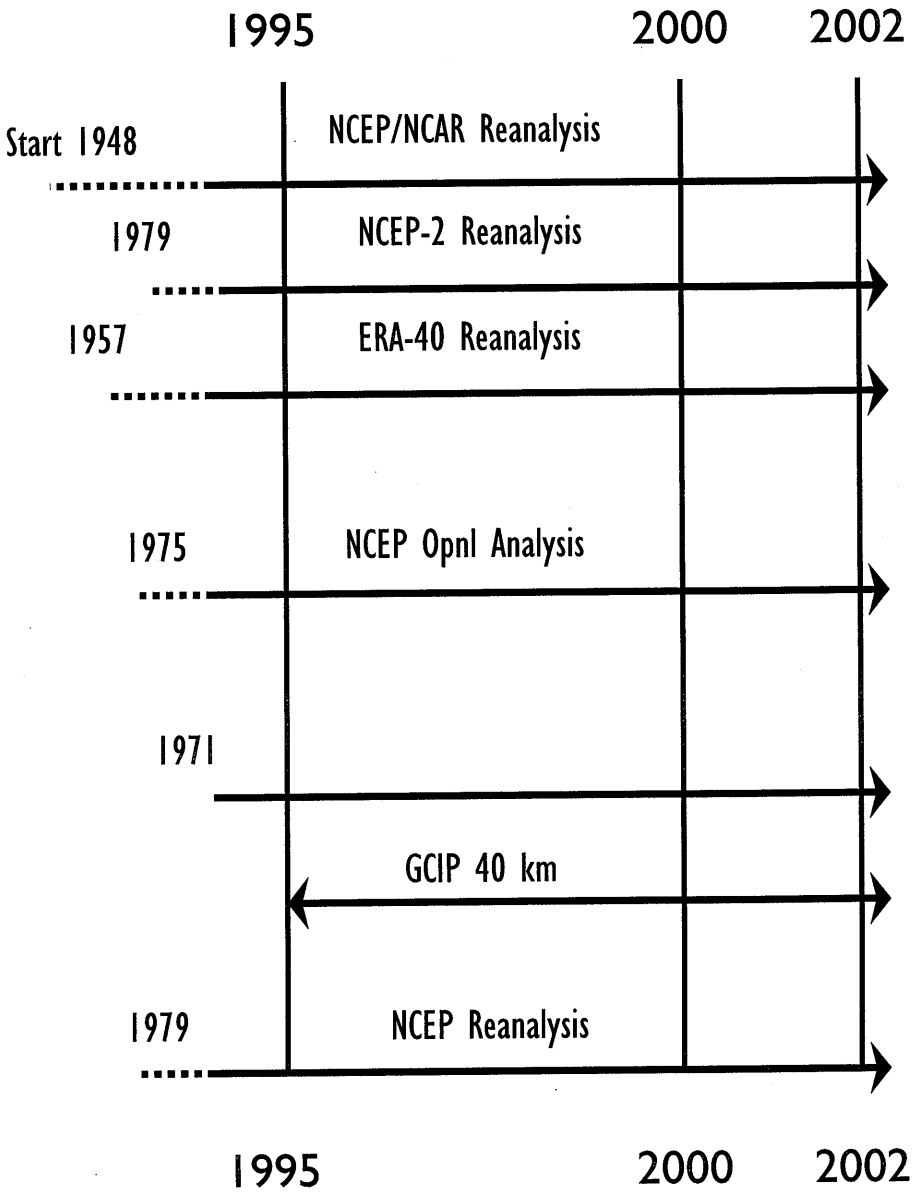
# Model Data at NCAR DSS

A. Global 4xday reanalysis
- 208 km
- 208 km
- 83 km (will have)

B. NCEP opnl global
- 2.5°

C. N. America mesoscale

- (coming)




D. Three climate models
- Yr-mo data about 1800 to 2100

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*May 2002*

Roy Jenne
Jan 2002

# DSS Scientific Archives used on NCAR Computers

## (Gbytes read per year)

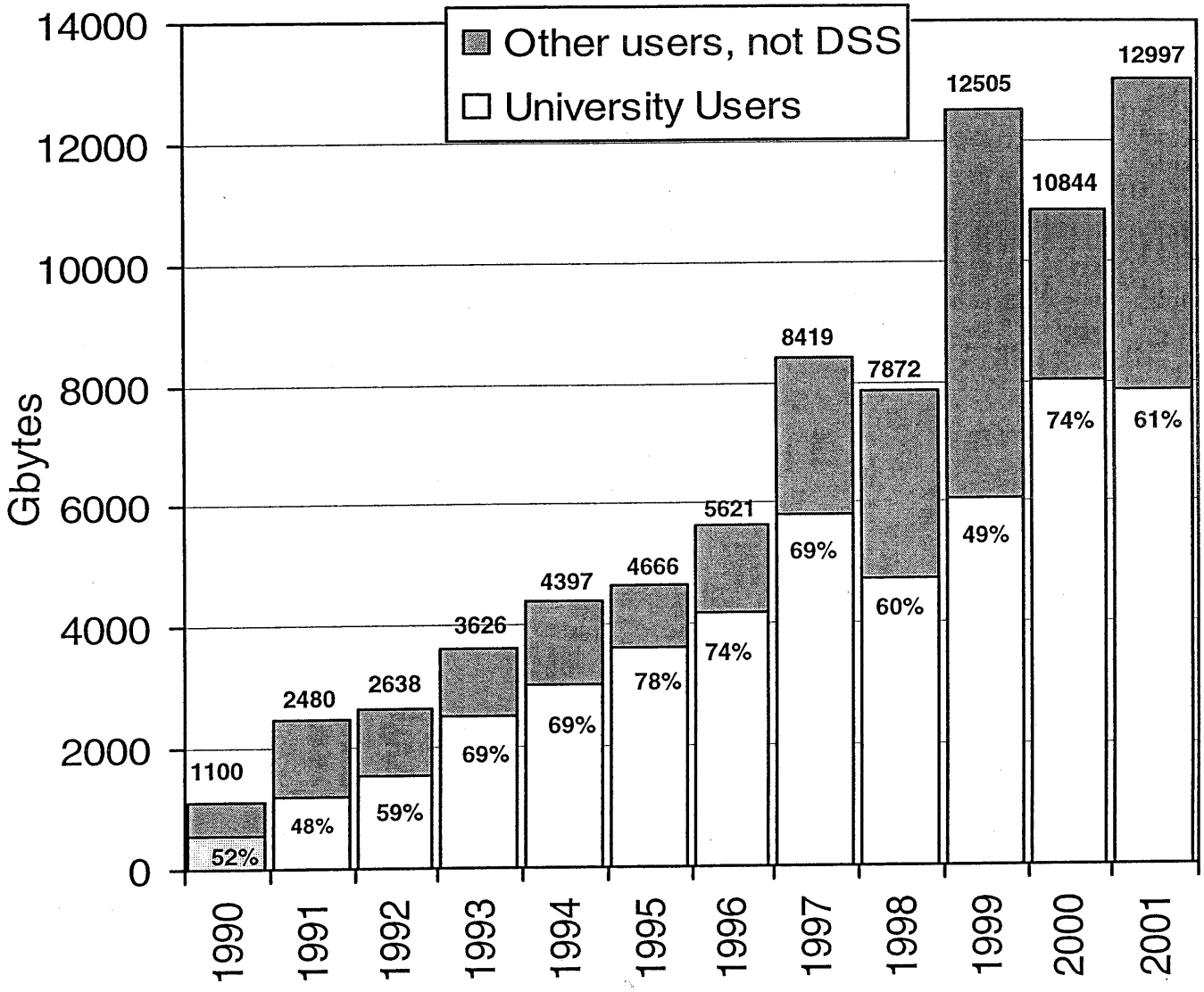


Figure 1: Data from Data Support archives that are read into user programs (not DSS), which are run on main computers at NCAR. The Gbytes read during each year are shown. A large portion of the use is by the universities. Most of the "other users' are NCAR users.

# Total Use of Data Support/SCD Archives at NCAR (Gbytes)

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*May 2002*

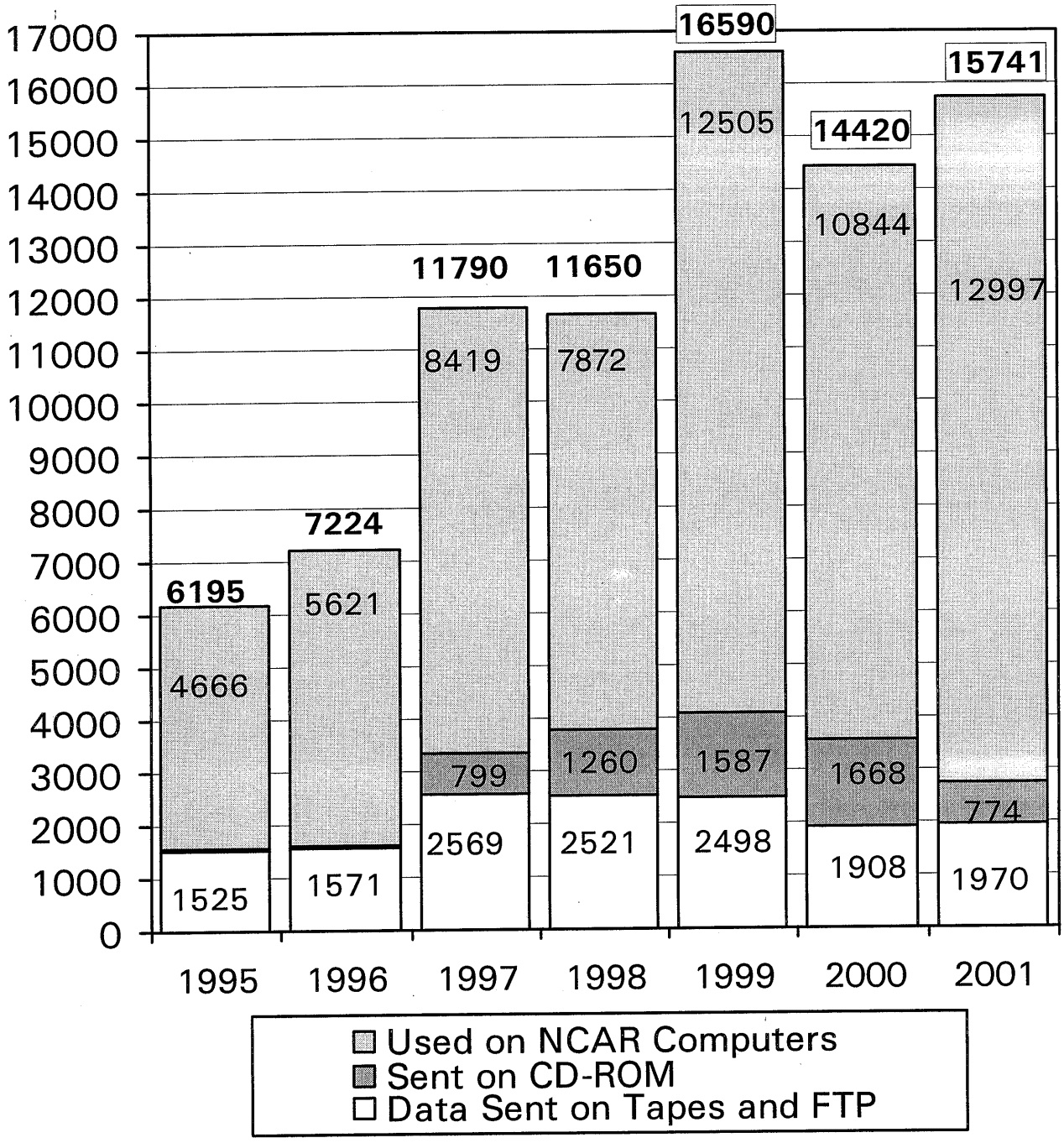



**Figure 3.** The total volume of data sent by the Data Support Section of SCD/NCAR. Data sent on tape or CD-ROM is probably used 2 or 3 times on average, so it is actually a greater part of total data use than is indicated here. The total also includes Web data.

*Roy Jenne*
*May 2002*

# DSS Data Archives Used on NCAR Computers
## (Gbytes read per year)

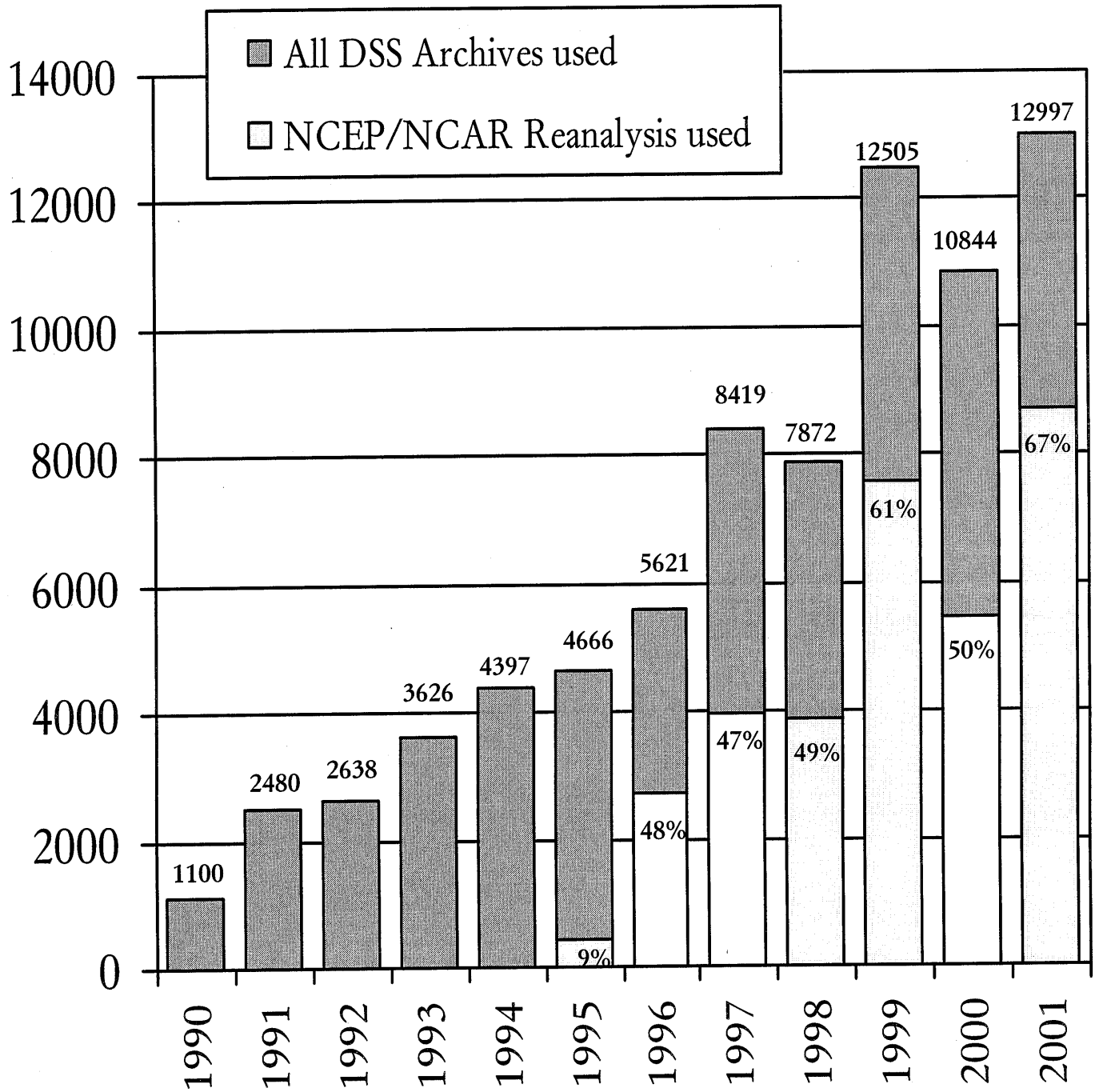



**Figure 2.** Data from Data Support archives that are read into user programs (not DSS), which are run on main computers at NCAR. The Gbytes read during each year are shown. The chart shows the use of all data and the portion that is NCEP/NCAR reanalysis data.

*Roy Jenne*
*May 2002*

# NCAR DSS Reanalysis Data Used and Total Data for Users

## (GBytes used per year)

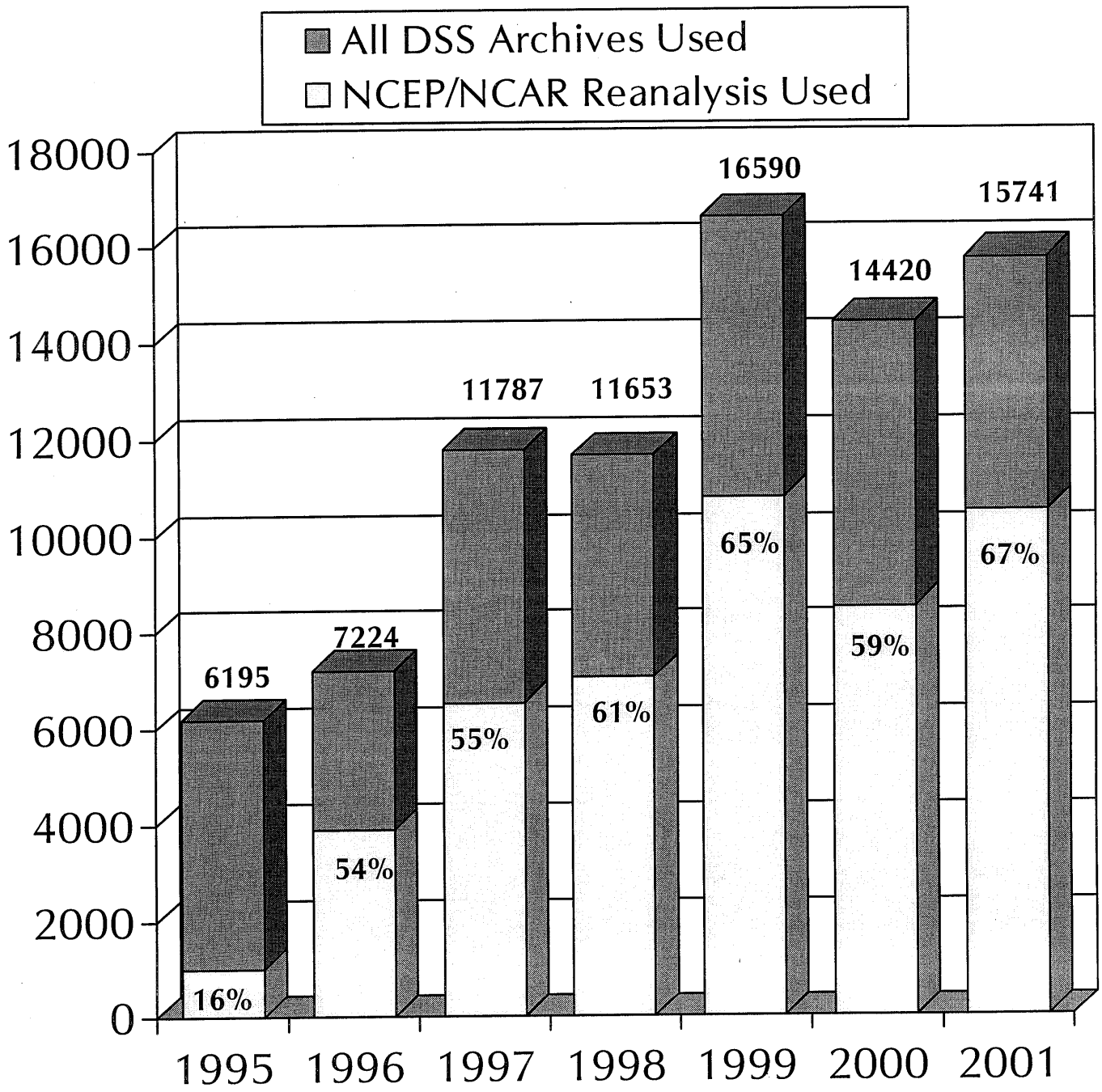



**Figure 4.** The amount (GBytes) of reanalysis data used from NCAR archives is compared with the total data use each year. The percentage of total data that is for reanalysis is shown also.

# A Few Slides About NCEP/NCAR Reanalysis

- There are more observations in Version 3.
- The observations are also good for mesoscale projects.
  - Anyplace in the world.
- We want an integrated set of Version 3 with some model tags.

*Roy Jenne*
*10 May 2002*

# Table 1. Seven Main Sets of World Observations

## World Weather History for 54 Years

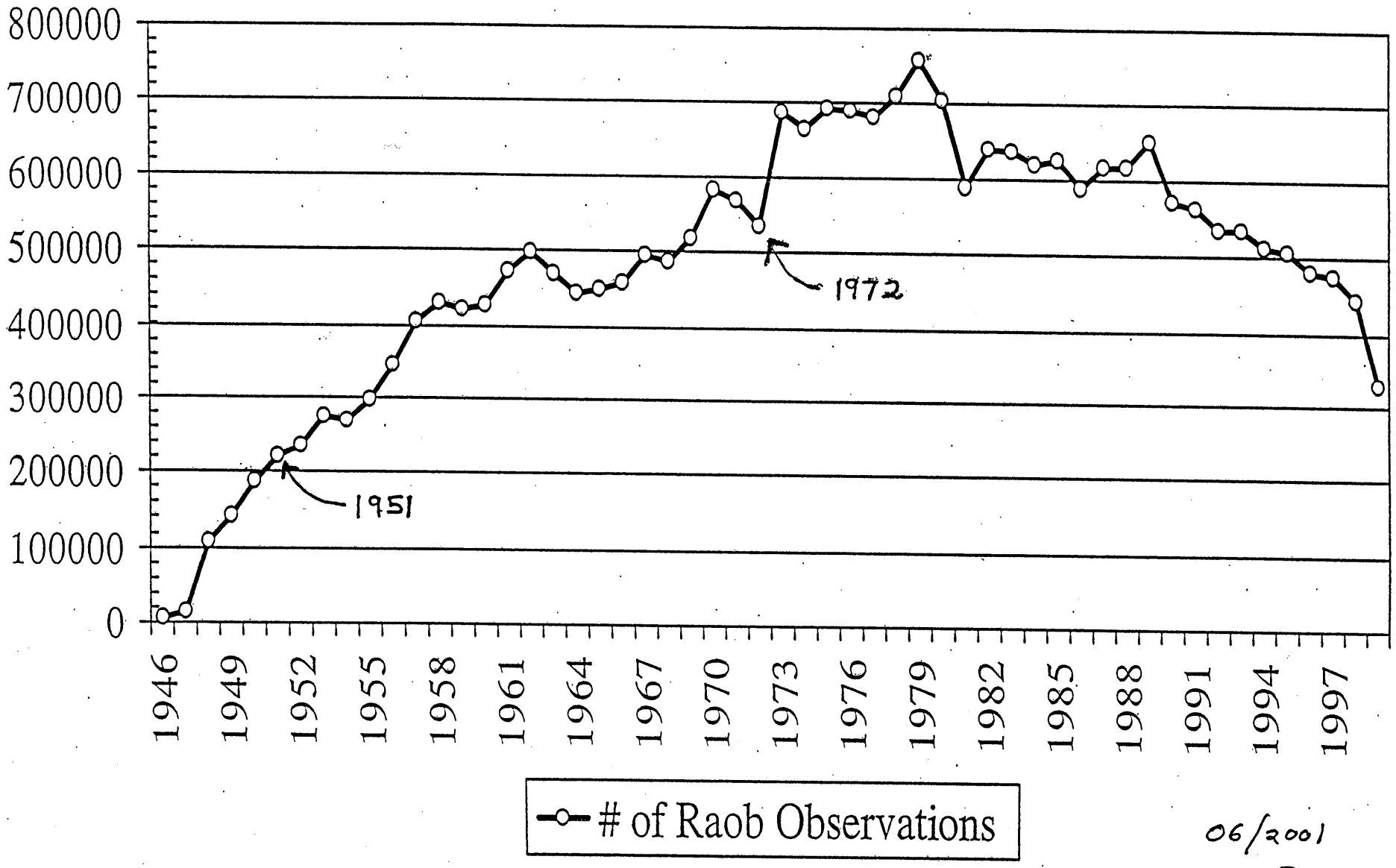
| | | Data Years | Number Years | Work at NCAR: First Start | Work at NCAR: Recent Work | Comments |
|---|---|---|---|---|---|---|
| a. | Rawinsondes | 1946-on | 56 | 1967 | 1991-01 | Some earlier data |
| b. | Pibals | 1942-on | 60 | 1973 | 1991-01 | Some earlier data |
| c. | Aircraft | 1947-on | 55 | 1973 | 1992-00 | |
| d. | Sat cloud winds | 1967-on | 35 | 1973 | 1991-95 | Cover better 1973-on |
| e. | Satl soundings | 1969-on | 32 | 1973 | 1991-00 | Better 1973-on |
| f. | Sfc 3-hr synop | 1948-on | 54 | 1976 | 1992-01 | Density incr 1967-on |
| g. | COADS ocean sfc | 1854-on | 146 | 1981 | 1988-01 | Some earlier data |

These 7 datasets are the main DSS success story.

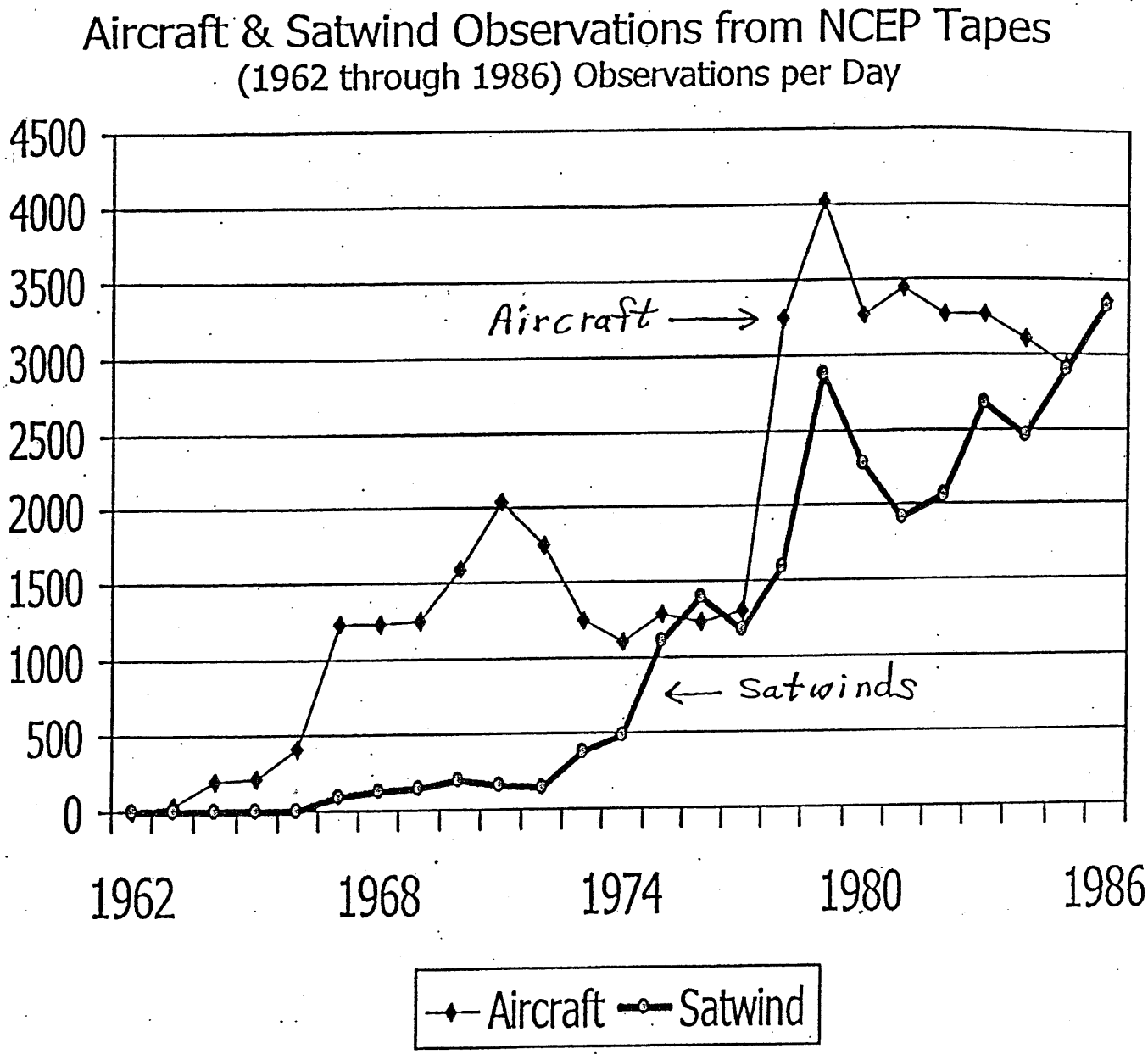
*Roy Jenne*
*NCAR*
*Aug 2001*

# Total of all WMO, WBAN & Other Reports per Year

## (Unique Rawinsonde Observations per Year)




06/2001
NCAR




- 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.

*Roy Jenne*
*April 1999*

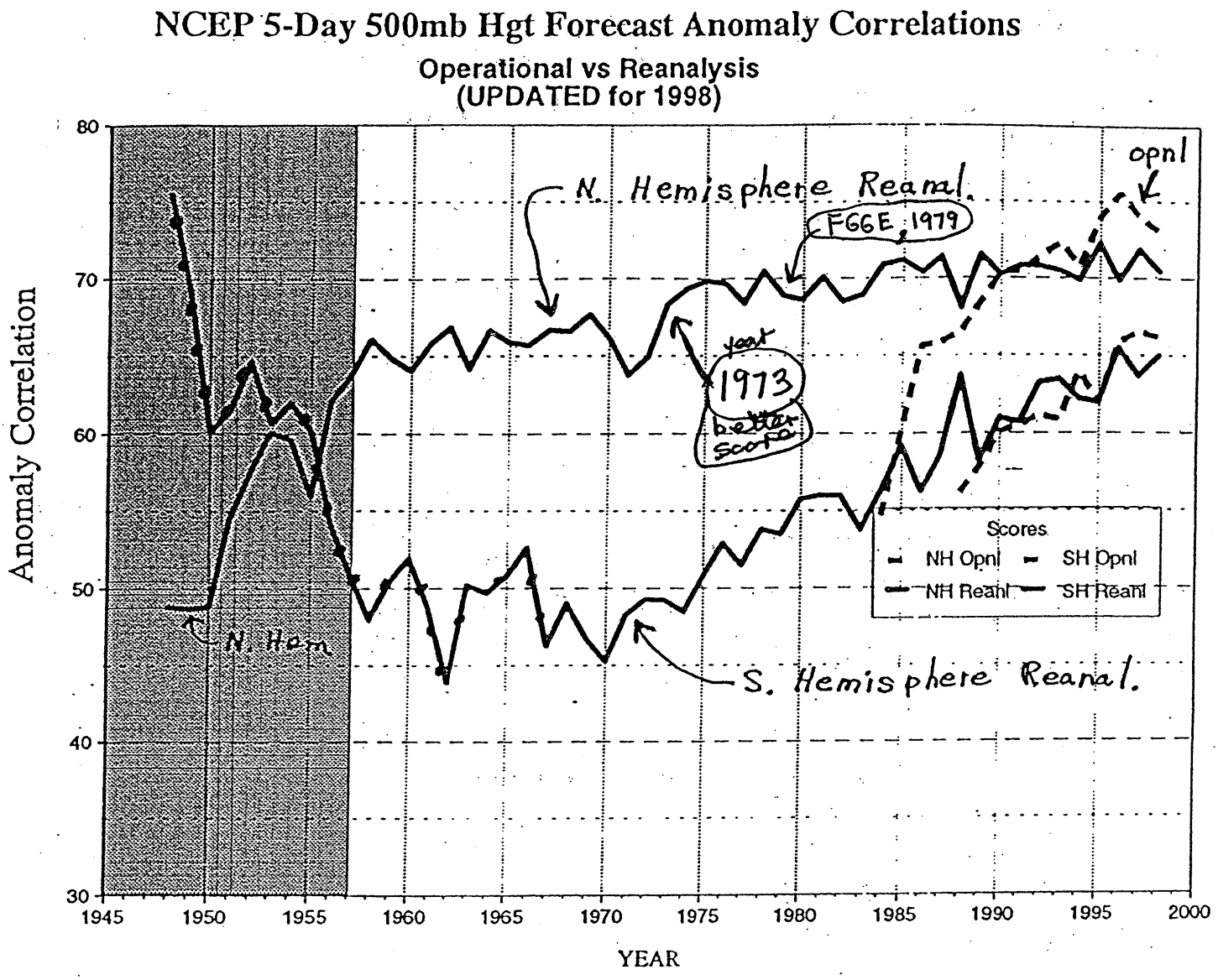
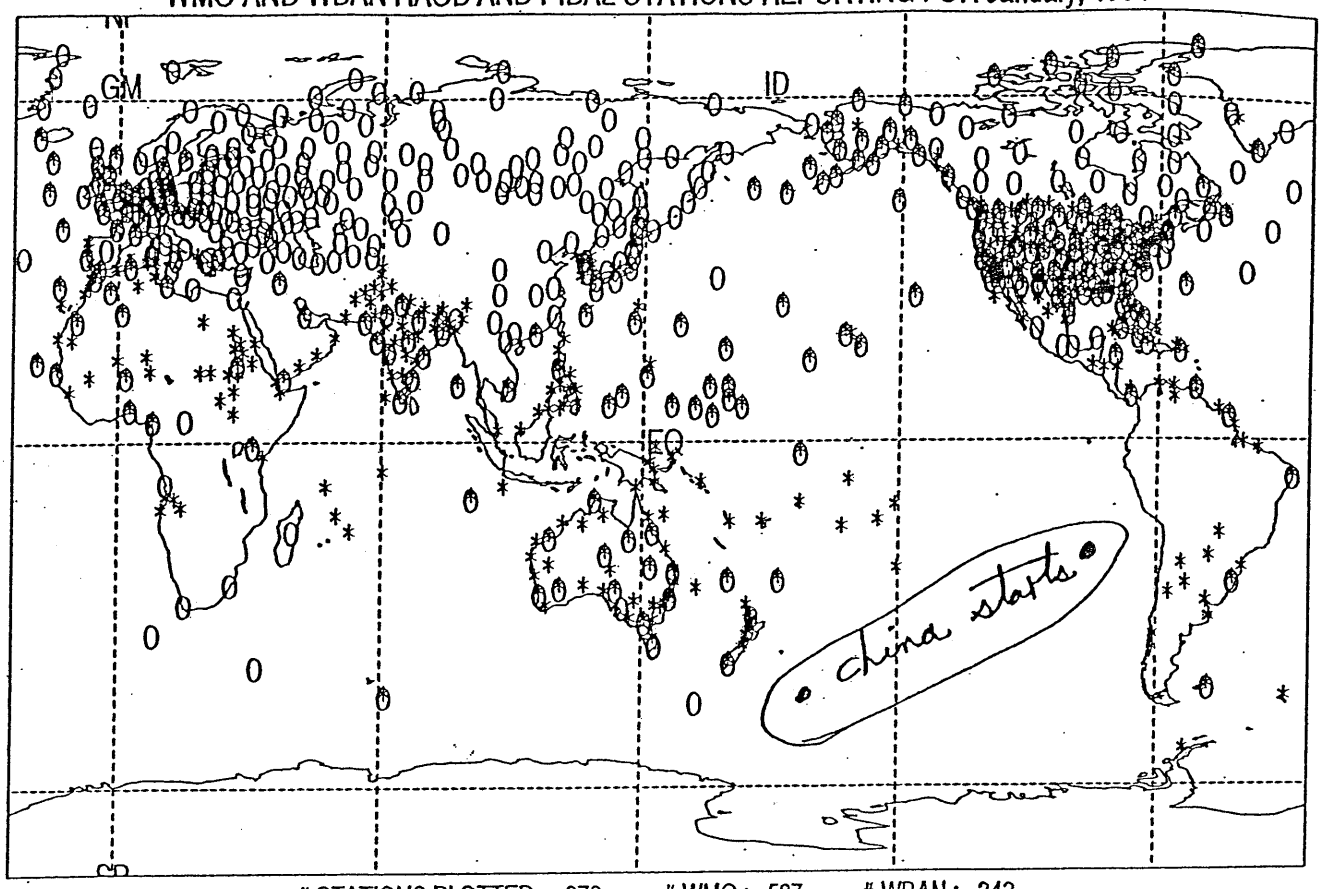



Figure 11. NCEP five-day forecast scores for reanalysis are given in heavy lines for each hemisphere. We think that the drop in 1971 – 72 (N. Hemisphere) was caused by a drop in observations. The forecast scores for reanalysis, for 1952 – 1998 in the N. Hemisphere are better than the operational scores in 1984. This chart is from Kistler and Kalnay in May 1999. An earlier 1997 version had a mechanical problem.

Jan 1954

WMO AND WBAN RAOB AND PIBAL STATIONS REPORTING FOR January, 1954




# STATIONS PLOTTED: 870

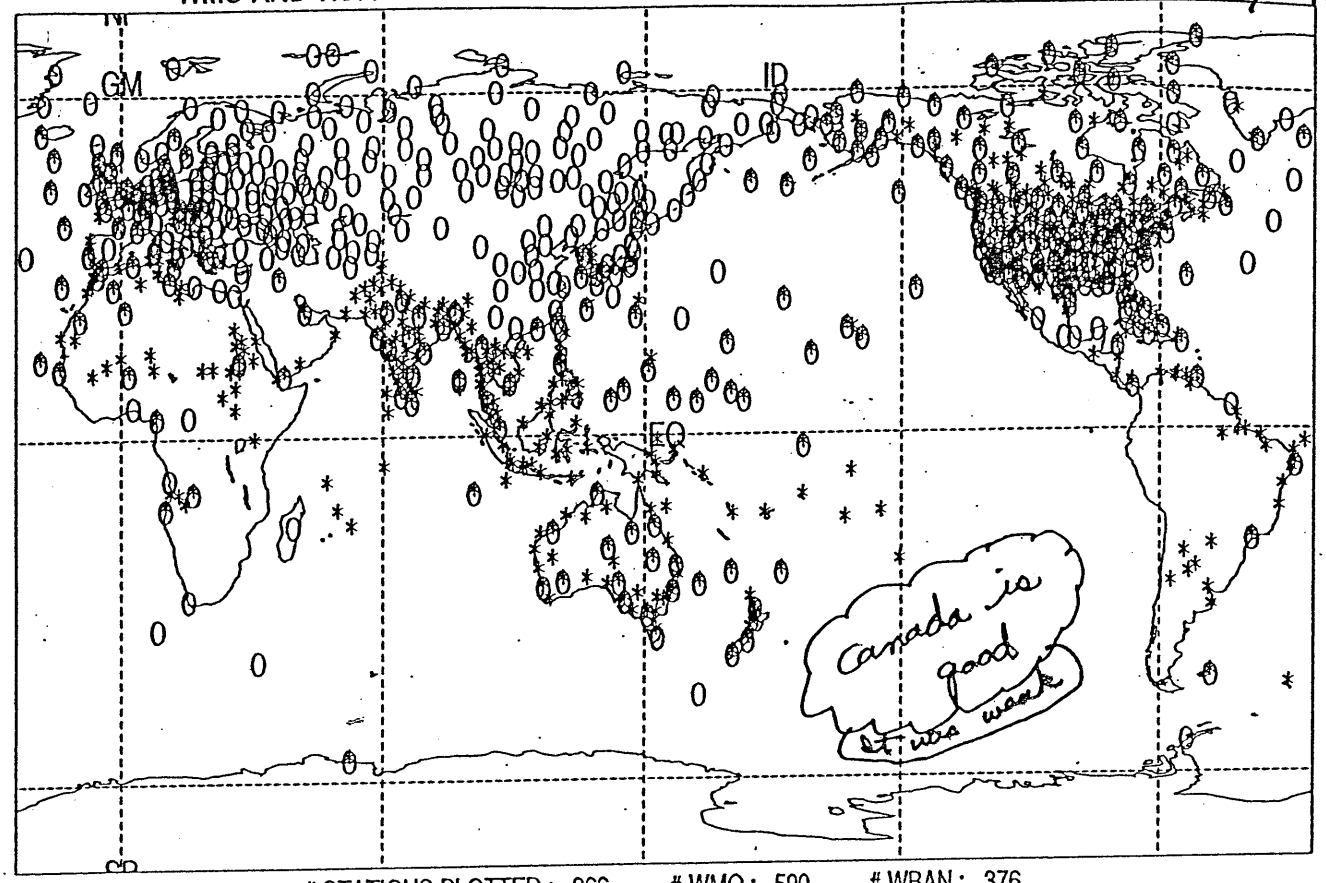
# WMO: 527
wmo raobs: 353
wmo pibals: 286

# WBAN: 343
wban raobs: 168
wban pibals: 324

O = raob
* = pibal

Jul 1955

WMO AND WBAN RAOB AND PIBAL STATIONS REPORTING FOR July, 1955 07/1955




# STATIONS PLOTTED : 966

# WMO : 590
wmo raobs : 355
wmo pibals : 363

# WBAN : 376
wban raobs : 186
wban pibals : 364

O = raob
* = pibal

# Some Methods to Send Data

1.

| Date | Tech | Native Capacity | Tapes/TB | Remark |
|---|---|---|---|---|
| 1960-72 | 0.5 inch | 10 MB | 100,000 | |
| 1986 | IBM 3480 | 190 MB | 5,263 | |
| 04/1995 | DLT 4000 | 20 GB | 50 | |
| 2001 | DLT 8000 | 40 GB | 25 | Drive $2300 (04/02) |
| ~2002 | | ~100 GB | 10 | |

2.

| Date | Discs | Capacity |
|---|---|---|
| 1987 – 2002 | CD-ROM | 0.66 GB each |
| 2002 | DVD | 4.7 GB |
| Soon | | 9.4 GB or more |

3. Internet

NOTE: Some tapes now hold 200 GB

- So 5 tapes hold 1 TB
- NCAR now has 1 TB of mesoscale data
- Pressure stack global reanalysis, 54 years is 1.37 TB
- In 1960 to 70, 1 TB of data needed 100,000 tapes

These methods help do bulk transfer of data.

*Roy Jenne*
*May 2002*

# Examples of Bundles of Papers

1. Data lists for several countries
   - Canada, England, Japan, Australia, Africa
   - WMO lists

2. Observations for reanalysis (2700 pages)
   - Raobs and pibals ~1240 pages
   - Surface land observations ~300 pages
   - Satellite data ~900 pages
   - Early observations in USA, etc. ~300 pages

3. Technology, computing ~1700 pages
   - Technology: Good use, hype, bubble 59 pages

4. Selected science topics ~810 pages
   - Past climate of earth: Ice ages and more 71 pages

5. Other types of data ~660 pages
   - Guide to world social and economic data 137 pages

How to find the RJ bundles of papers:
http://dss.ucar.edu/docs/papers-scanned/papers.html

*Roy Jenne*
*9 May 2002*

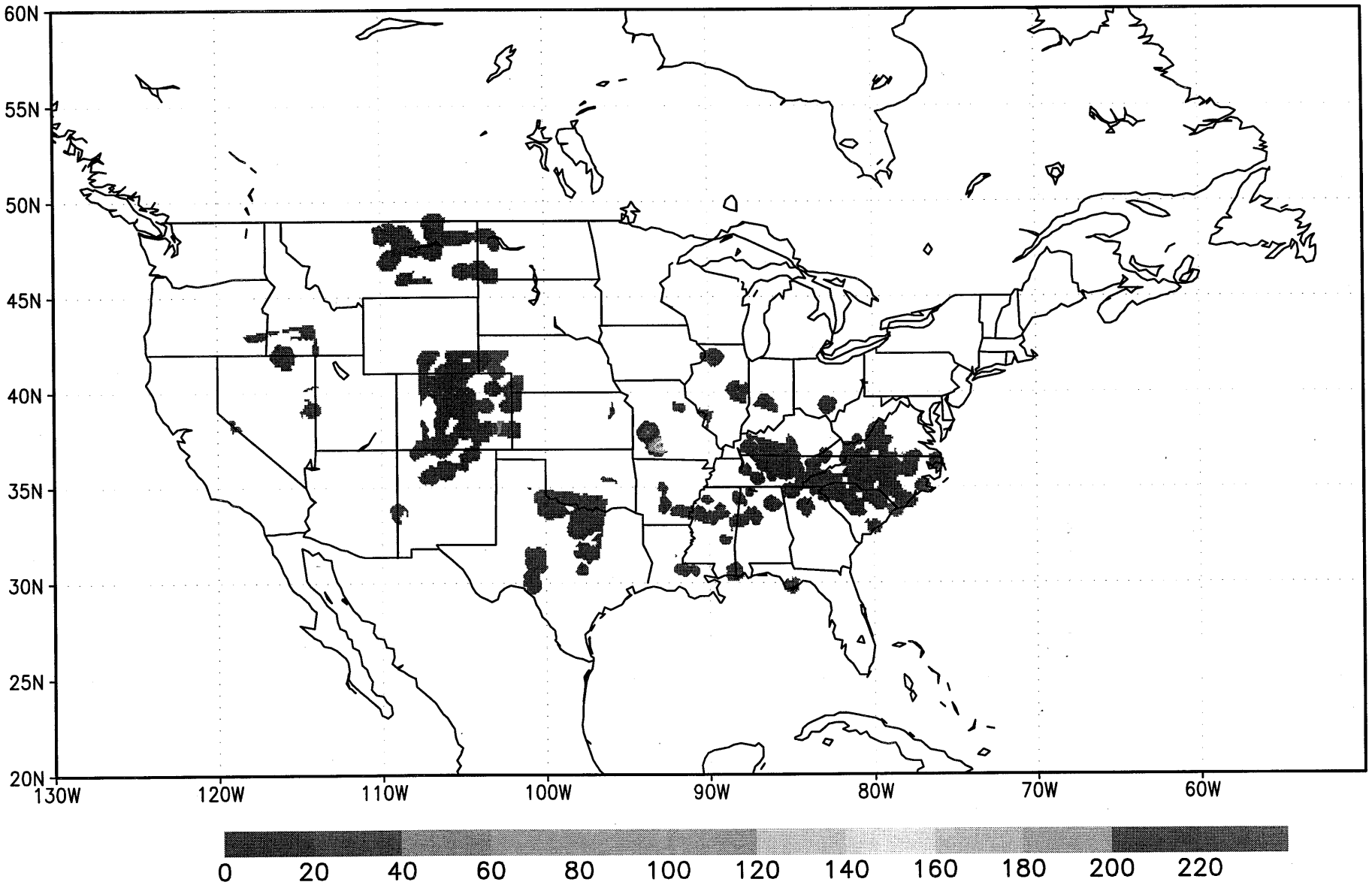
# US Grids of Precip from NCEP

Hourly and Daily

- Grids from gage precip
  - Hourly grids 01/1995 – 03/2002
  - Daily grids 01/1996 – 03/2002
- Grids of only radar data
- Grids of radar plus gages
- There are some problems with first 3 grids here
- Grids from river forecast center

*Roy Jenne*
*10 May 2002*

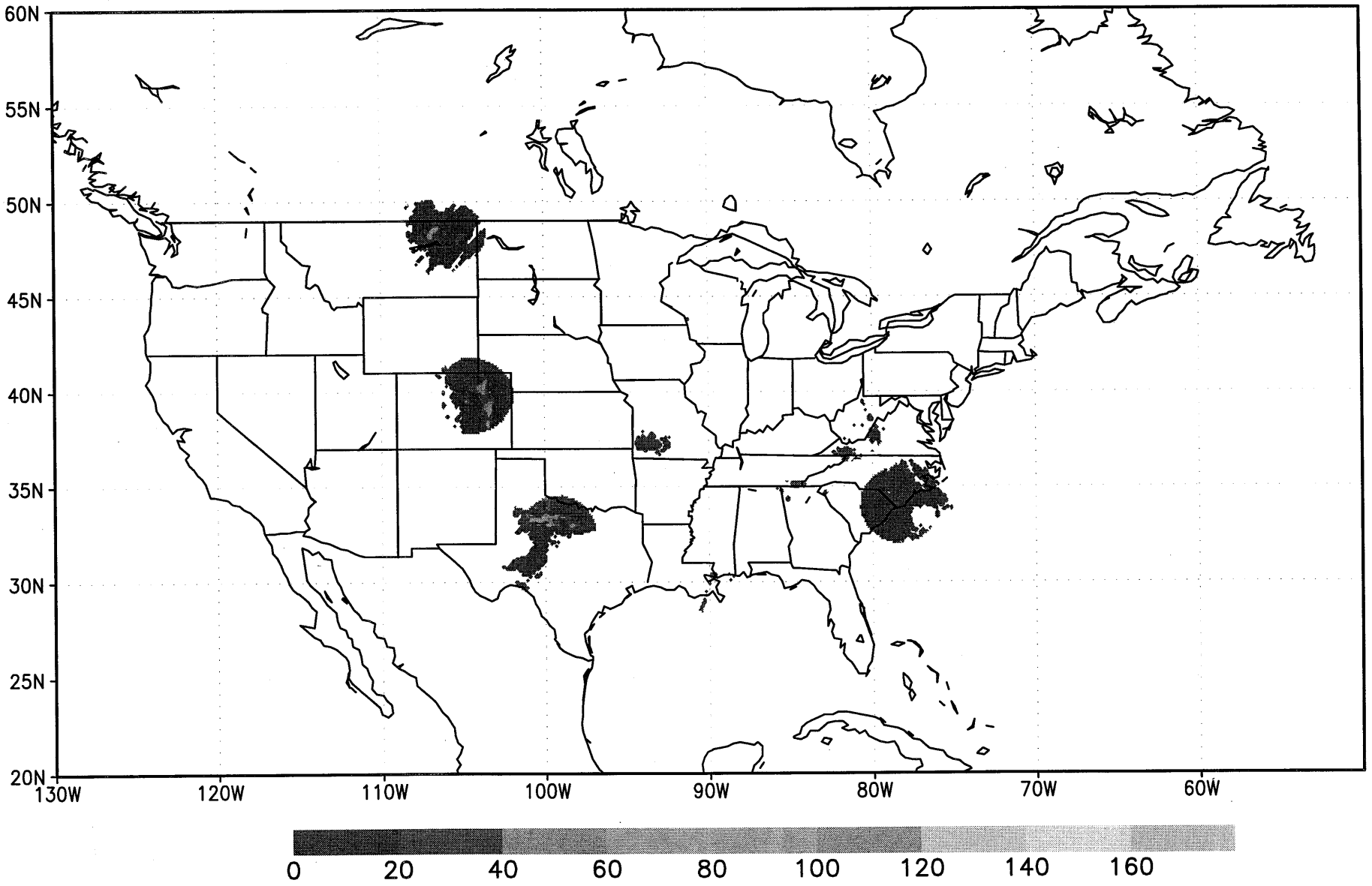
# 24 Hour Gage Precipitation, April 30, 2000; mm




GrADS: COLA/IGES

2001-04-25-11:46

# 24 Hour Radar Precipitation, April 30, 2000; mm




GrADS: COLA/IGES

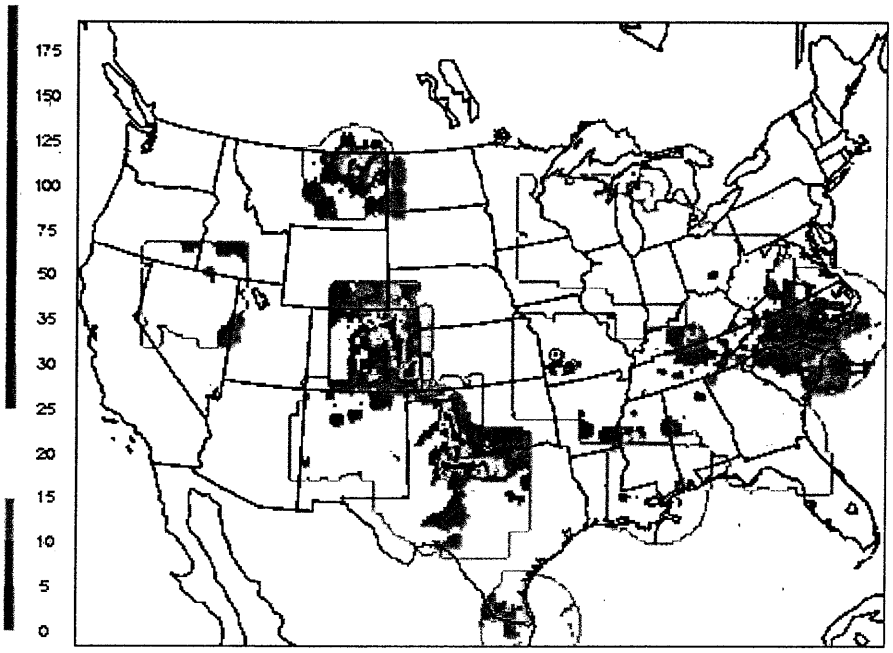
2001-04-25-11:46

← radar plus gage

PRECIP (mm)
24h accum
VALID 12Z 30 APR 00

MULTI-SENSOR

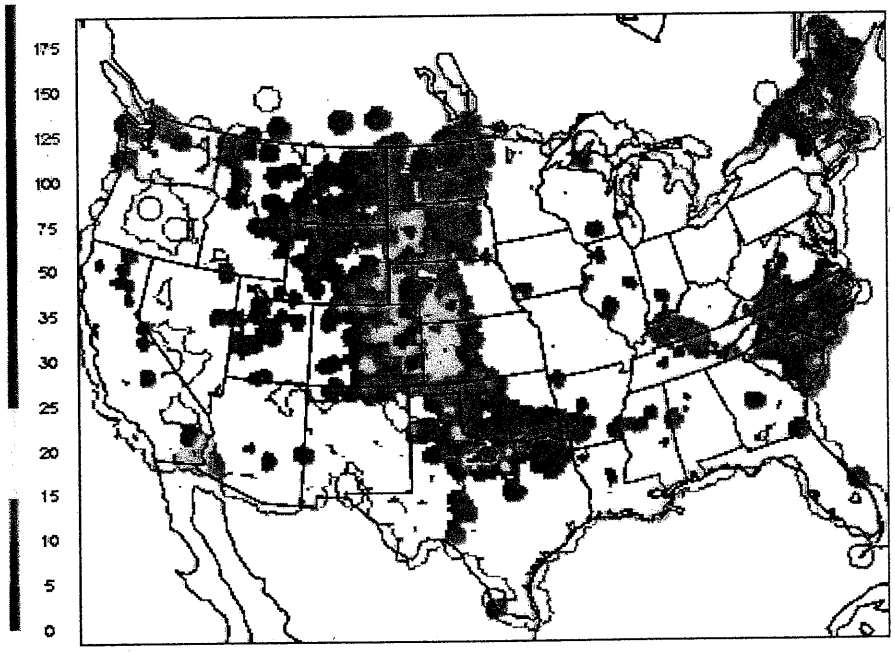
14.3 KM POL STR GRD




PRECIP (mm)
24h accum
VALID 12Z 30 APR 00

24h RFC ANALYSIS

14.3 KM POL STR GRD



# A few more slides

# about

# Water Data

# will follow

- Precip data
- Precip grids
- River discharge

*Roy Jenne*
*May 2002*

# Precipitation Data for North America

1. Hourly precip data (USA)
   - 2500 hourly stations (1948-2001) — NCDC
   - Hourly US Precip grids by CPC (1948-99)
   - NCEP:
     a. Hourly real time precip, stn archives, started Jan 1996
     b. Hourly US precip grid, stations only, start Jan 1996
     c. Hourly US precip, radar only, started Jan 1996
     d. Hourly US precip, radar plus stations, start Apr 1996

Hourly grids

DAILY OBSERVATIONS FOLLOW

2. Daily precip data (USA)
   - 7500 co-op stations (1895-on) — NCDC
   - NCEP
     a. Daily precip obs (real time) started Apr 1995
     b. Daily US grids started Apr 1995 (based on NCEP inputs)

3. Daily precip Canada
   - About 2500 stations
   - Data in US for early years through 1991

4. Daily precip for Mexico
   - A tape of data is in the USA

*Roy Jenne*
*Dec 1997*
*Revised May 2002*

# Daily Grids of Precipitation over Americas

## Data Sources (Daily Observations)

| | |
|---|---|
| US | 1948 – 1996; daily, from HPD (~2900) |
| Mexico | 1948 – 1990 (~300 stations) |
| Central America | 1979 – 1993 (22) |
| Canada | 1963 – 1996 (490) |
| South America | 2001 – 2002 (~1100 stations) |

## Daily Precip Analysis for Each Region

1/4° grid for USA; other 1° x 1° grid
Use Cressman Scheme

## Merge Grids for all North America

1948 – 1990 (gives a 1° daily grid)

Note:
Not including Canada during 1948 – 1962
Not including Central America during 1948 – 1978

Who makes the grids?
– Prepared by CPC in NCEP

*Roy Jenne*
*Oct 1999*
*Rev May 2002*

# A Global Set of Monthly River Flow
## – Subset of Rivers –

| Regions | Rivers | Have? | Comment |
|---|---|---|---|
| Canada | 350 | Yes ? | 2600 stns on CD |
| USA | 450 | Yes | Of 8000 stns |
| Mexico | 40 | Yes | |
| Colombia | 20 | Yes | |
| Venezuela | 40 | Maybe get | |
| Brazil | 150 | No | |
| Argentina | 30 | No | |
| Africa | Min 40 | A few | |
| Australia | 200 ? | Yes | |
| China | 39 | Yes | |
| - more | 100 ? | Not yet | |
| India | 50 | No | |
| f USSR | 270 | Yes | |
| Cent Europe | 75 | No | |
| West Europe | 100 | No | |

Could WMO say . . .

- We need some open data (no restriction on data use)
- And encourage more open data
- Data updated each 1 to 3 years

*Roy Jenne*
*1999*

# River Data for Latin America

Henry Diaz has been working with Mike Dessinger (Scripps, 619/822-1507) to prepare data.

1. Mexico
   - Data for about 40 rivers, 10 – 40 years long.
   - The US got data on a CD and another source.
   - Monthly data, maybe also some daily.

2. Rivers in Columbia
   - Diaz had visitor from Columbia in July 1999.
   - Has data from 15 – 20 sites.
   - Record length about 10 – 40 years.

3. Venezuela
   - There is data for the big Orinoco River.
   - Henry visited there last year; he will send me an email contact.

*Roy Jenne*
*1999*

# Other Sources of Water Data

- Ocean precip from microwave data
- Tropical precip from TRMM
  - Launch Oct 1995
- Precip from 3-hour geosynchronous satellite data
  - Use IR threshold (GPCP data)
- Data from Grace satellite pair
  - Launch March 2002
  - Measure gravity with high precision
  - Information for snow amount, soil water, deep ocean currents, etc.
  - Launch March 2002
  - See document RJ0147 at NCAR

*Roy Jenne*
*9 May 2002*

# World Monthly Precipitation Grids

See Eischeid, et al.
(Journal of Applied Meteorology, Dec 1995: Vol. 34, No. 12)

1. The 5° monthly grids became available ~1990
   - From land areas, for the years 1851-1995
   - And 1880-on is quite good

2. Based on the monthly station data (the "DOE" set)
   - 7500 precip stations
   - 6000 temperature stations
   - Now use updates from NCDC

3. These observations and grids were used in IPCC 1995.

4. 2.5° grids have been available since February 1998
   - These are anomaly grids
   - One is a land-only precip grid
   - One includes MSU satellite precip anomaly over the oceans (1979-on). They blend quite easily.
   - Two forms: less smoothing or more smoothing
   - NCAR will have precip and temp grids valid ~2001.

5. Compare grids over land with Arkin grids
   - The numbers are about the same
   - The Arkin (NOAA-CPC) grids are smoother

*Roy Jenne*
*May 2002*