HANDLING TOMORROW'S ENVIRONMENTAL OBSERVATIONS

A CHALLENGE FOR NEW ECONOMY PIONEERS

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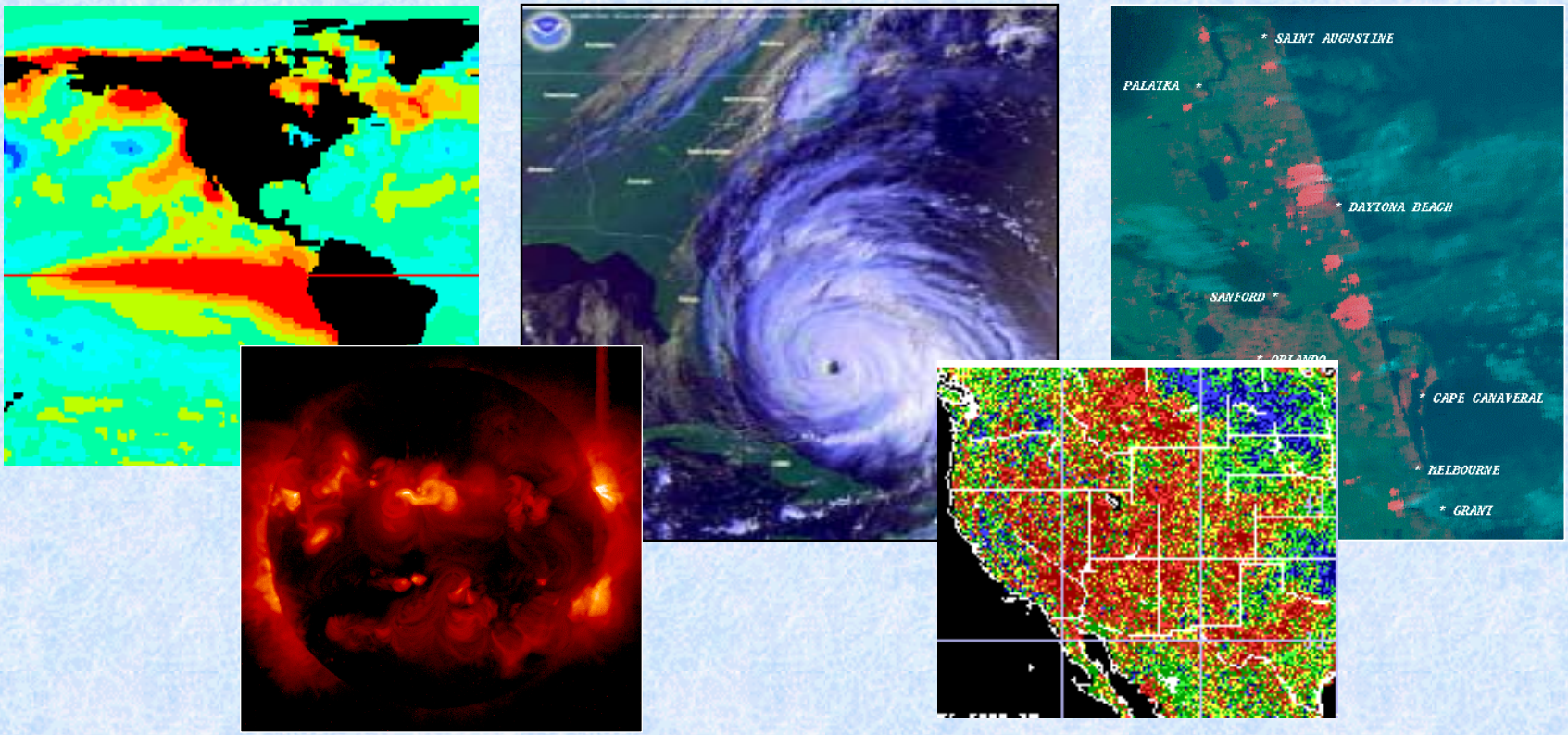
NOAA Serving The Nation

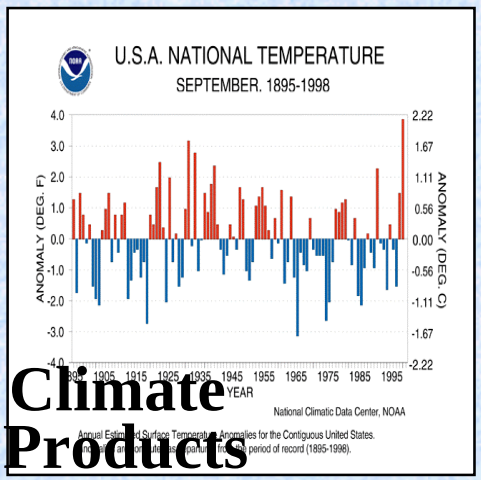
NOAA Observes Worldwide

NOAA's Operational Environmental Satellites

NOAA, through the National Environmental Satellite, Data, and Information Service (NESDIS) provides an *OPERATIONAL* remote sensing capability for acquiring and disseminating *GLOBAL* and regional imagery and measurements of the environment, including *METEOROLOGICAL, CLIMATIC, TERRESTRIAL, OCEANOGRAPHIC,* and *SOLAR-GEOPHYSICAL* data in support of the NOAA mission and the Nation.

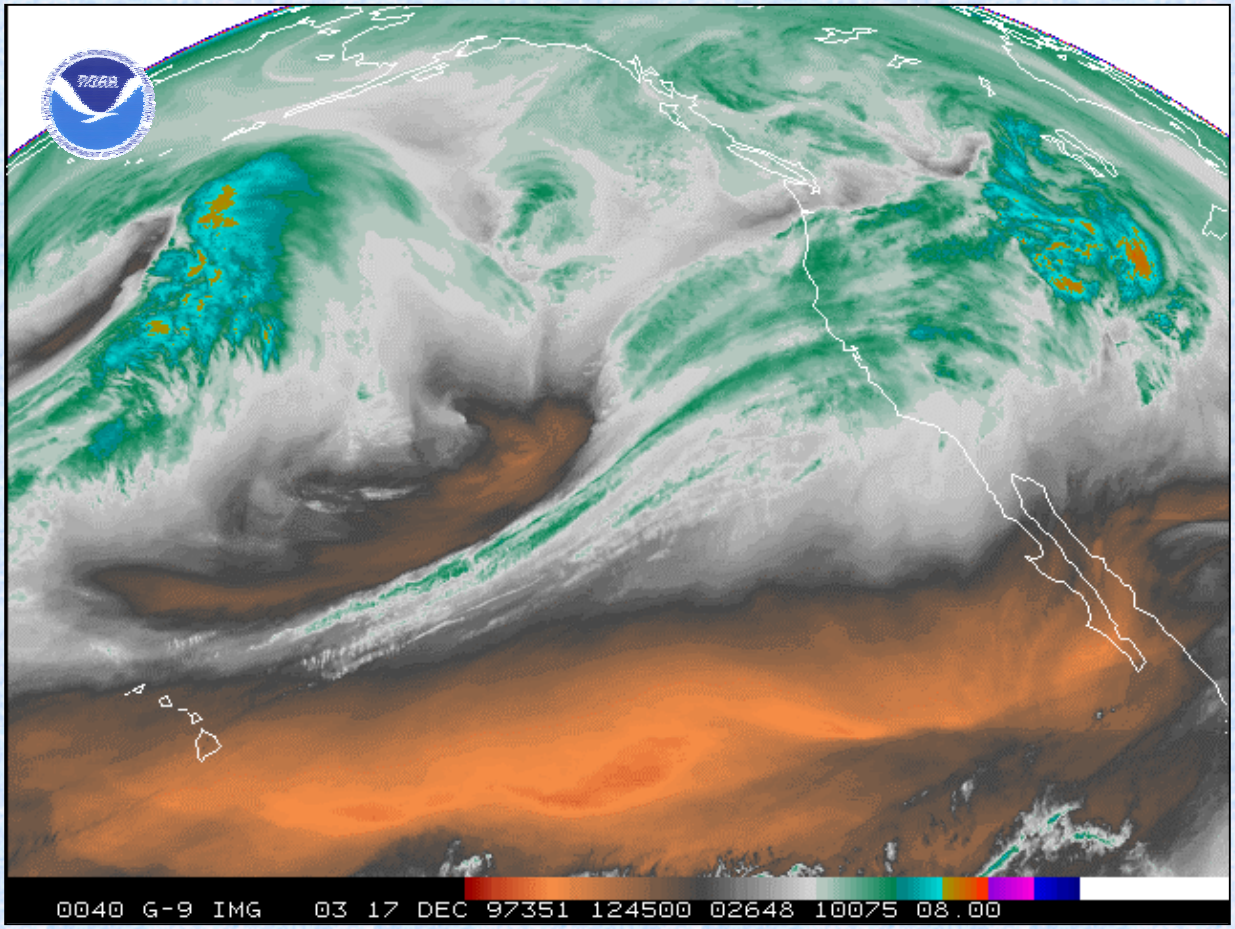


An End-to-End Responsibility



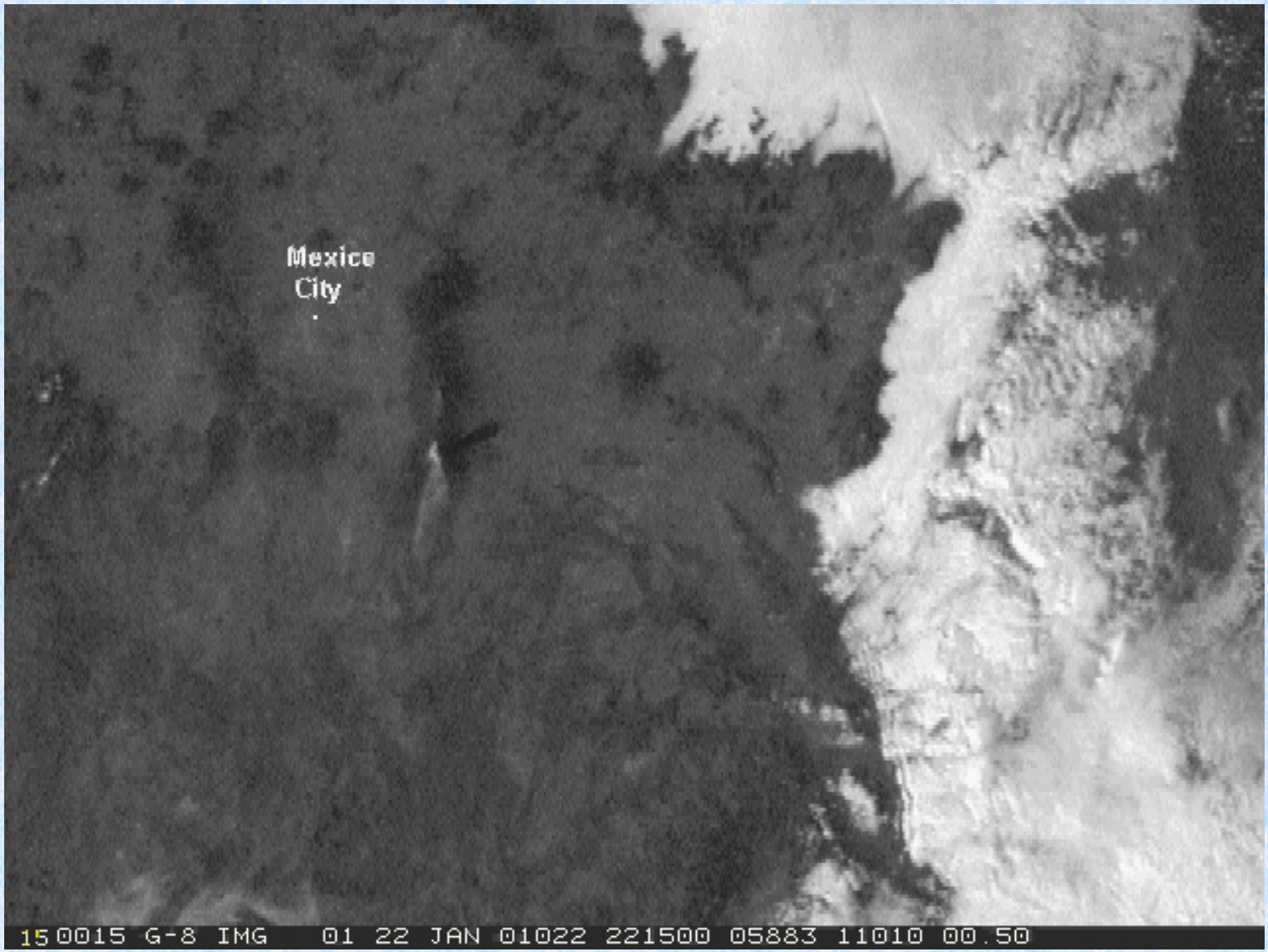
Climate
Products

1997-98 *El Nino* Winter Storm Forecasting

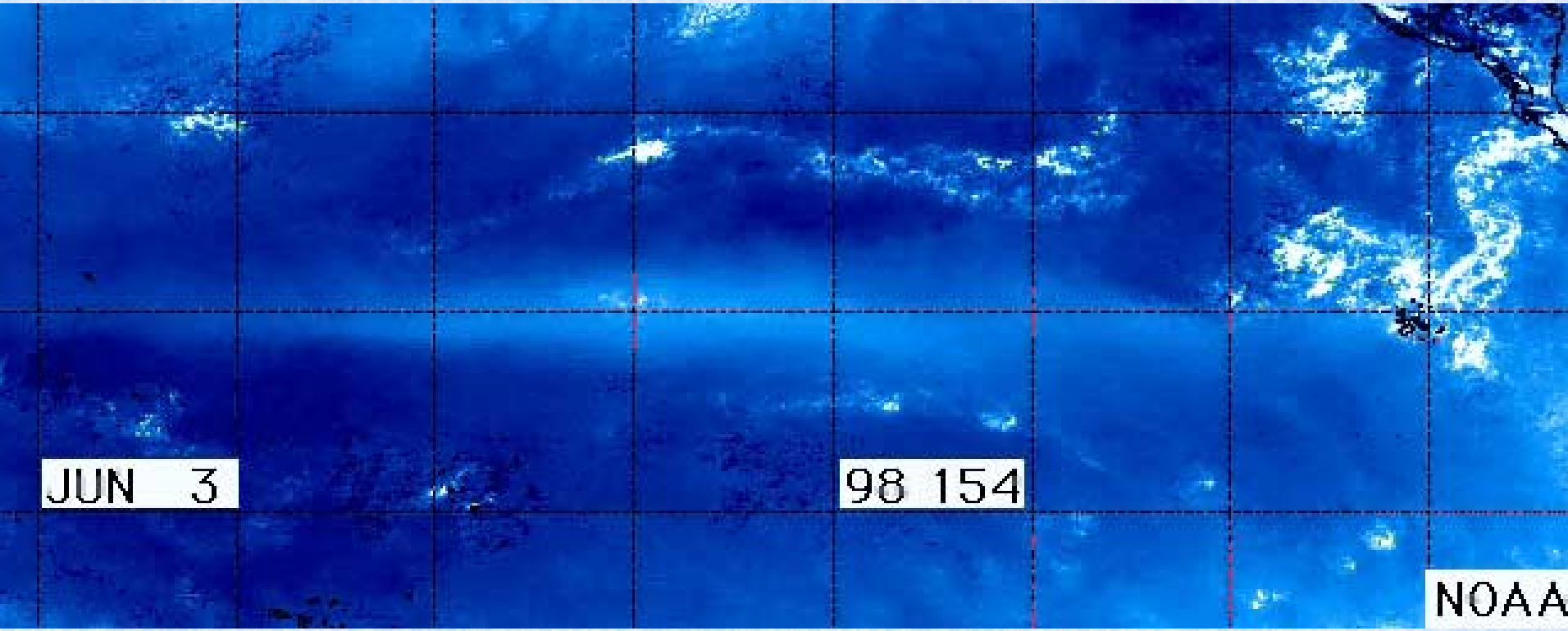


GOES Atmospheric moisture during El Nino Winter Storms of December 1997

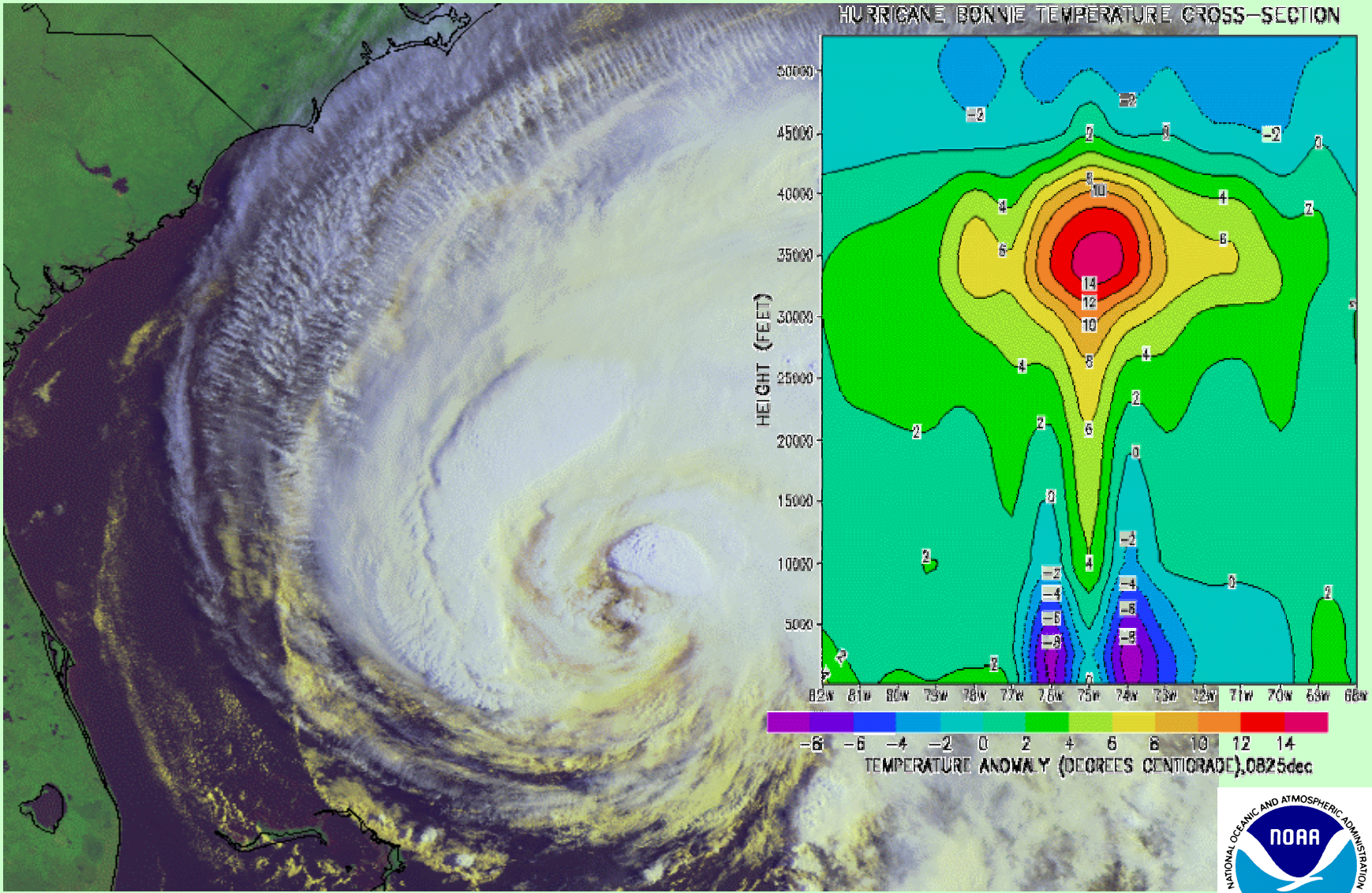
GOES – 8 Captures Eruption of Popocatepetl Volcano
January 22, 2001



GOES- SST daily SST maximum animation reveals return of La Nina

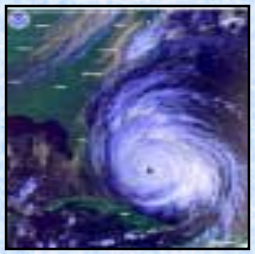


Hurricane Bonnie's warm core revealed in temperature anomaly cross section derived using NOAA-15 Advanced Microwave Sounding Unit (AMSU) data



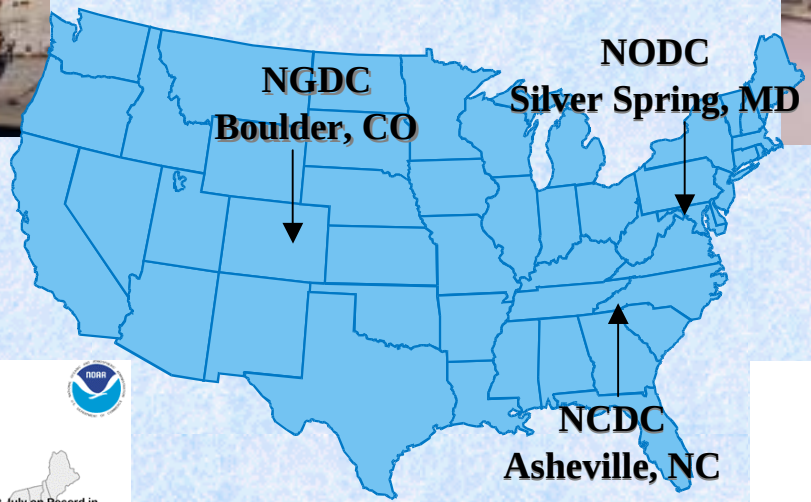
NESDIS Programs

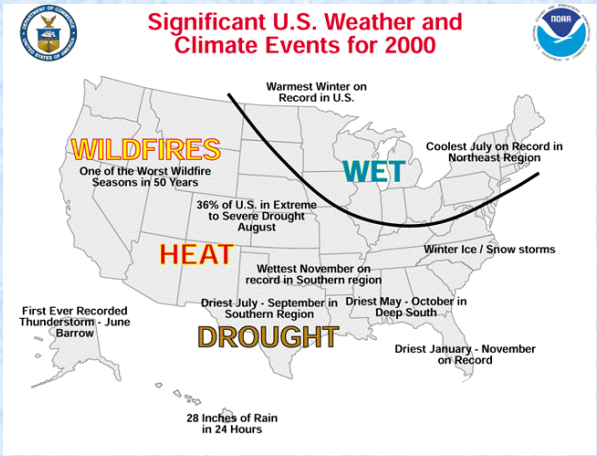


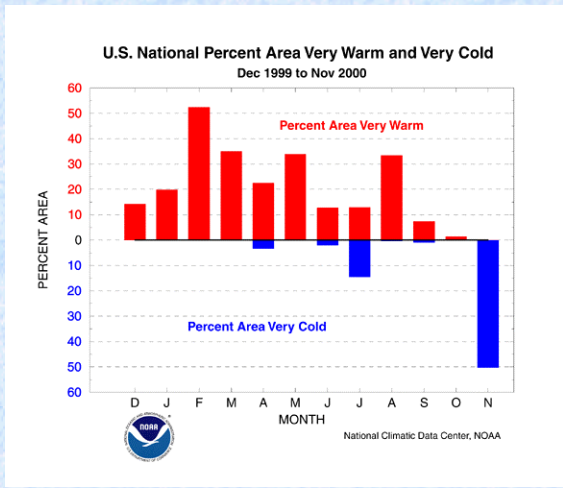




- Geostationary Operational Environmental Satellite (GOES)
- Polar-orbiting Operational Environmental Satellite (POES)
- National Polar-orbiting Operational Environmental Satellite System (NPOESS)
- Satellite Operational Services
- Environmental Data Management
- Applications Research and Development

NOAA's National Data Centers



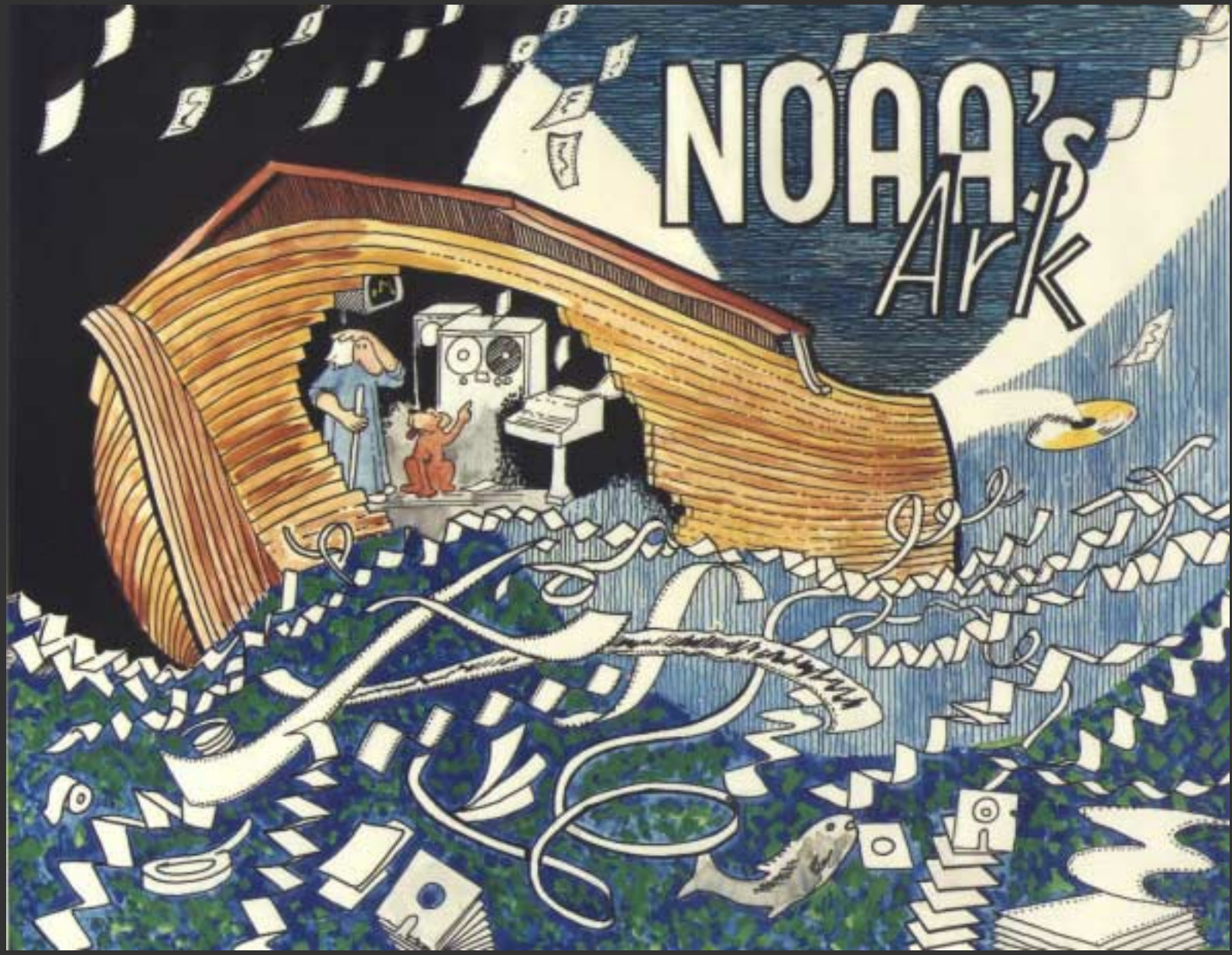




NOAA's Data System Capability

- Manages 3 National Data Centers and 7 World Data Centers
- Archived over 850 terabytes of data in FY 2000
- Maintains some 1300 data bases containing over 400 environmental variables
- Maintains over
  - 535,000 tapes
  - 375, 000,000 film records
  - 140,000,000 paper records

A View of NOAA Problems in 1990



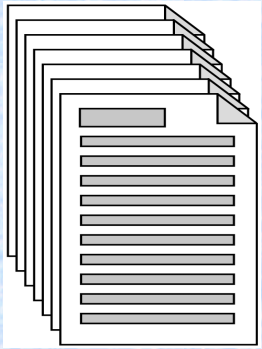
Challenges

- **Hard copy to electronic media**

- Rapid ingest of observational data
- Rapid access to data
- High-speed media migration
- Reprocess large volumes
- Improve integration of environmental observation

Non-digital Data Archive(Paper)

Non-digital Data Archive (Paper/film)



Manuscript/Autograph Paper Records

1990	2000
200 million pages	200+ million pages

35mm & 16mm Rolls of Film

1990	2000
125,000 rolls	125,000 rolls

Microfiche

1990	2000
1.2 million sheets	1.2 million sheets

Challenges

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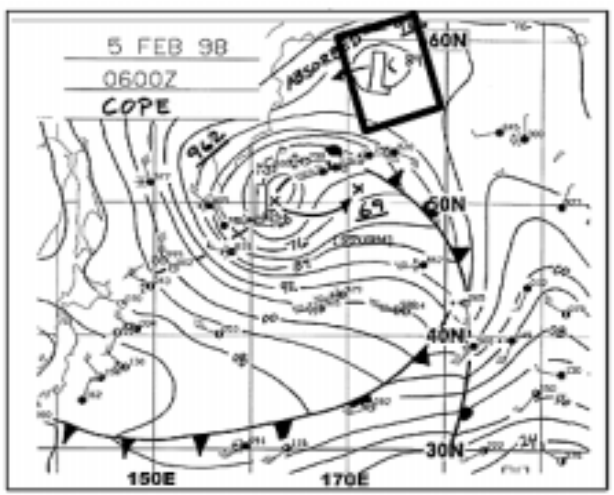
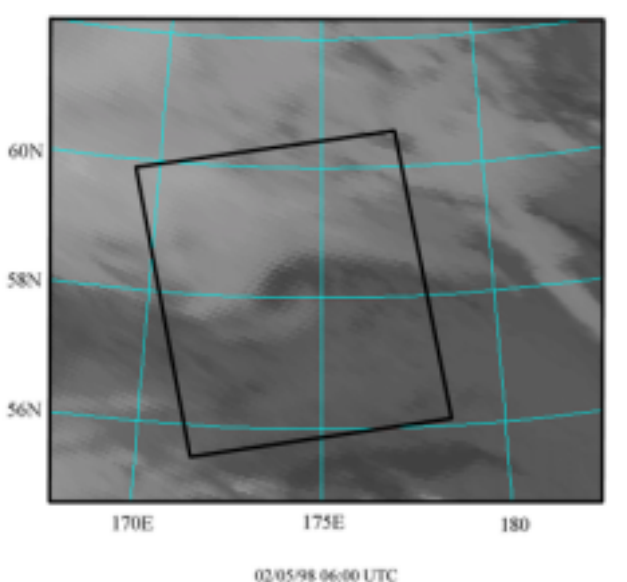
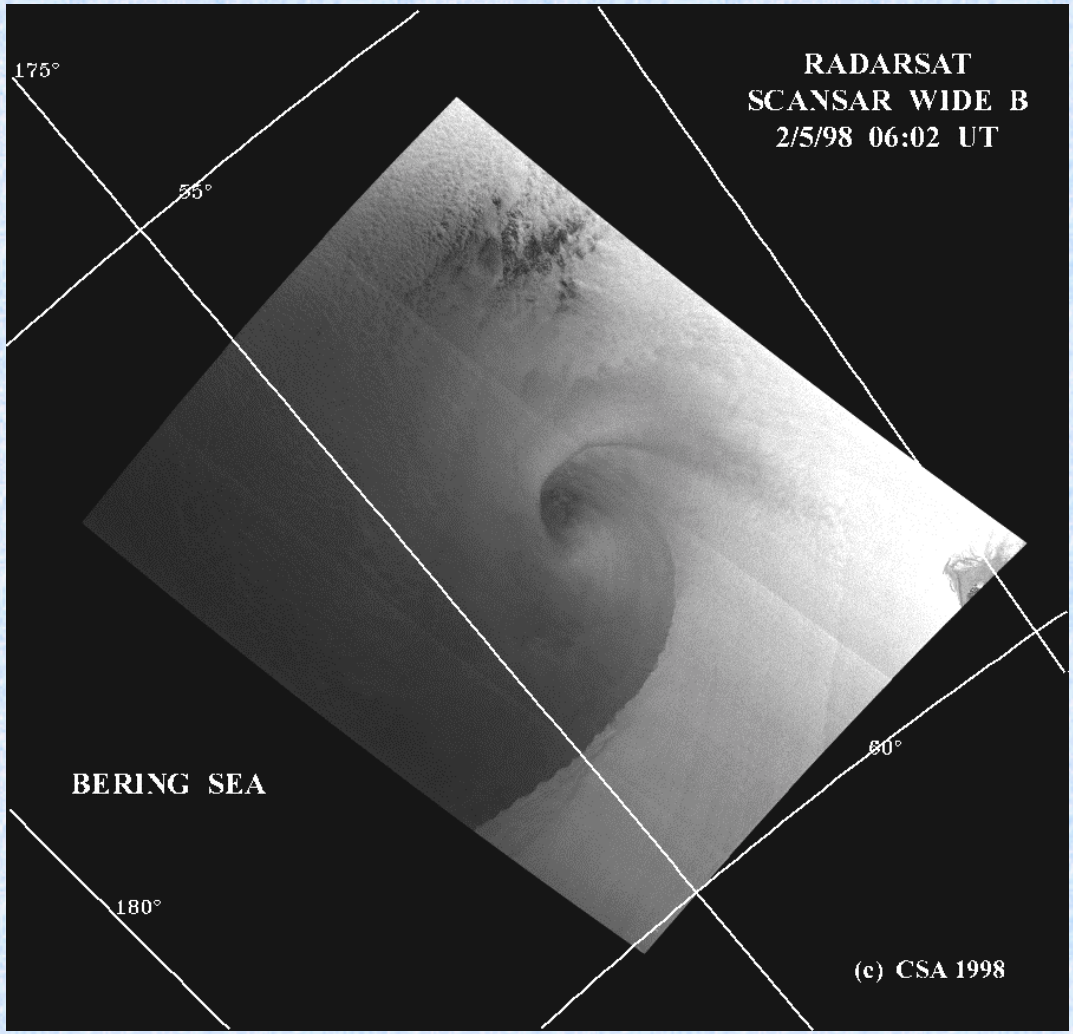
SAR Imagery Services for Improved Storm Warnings

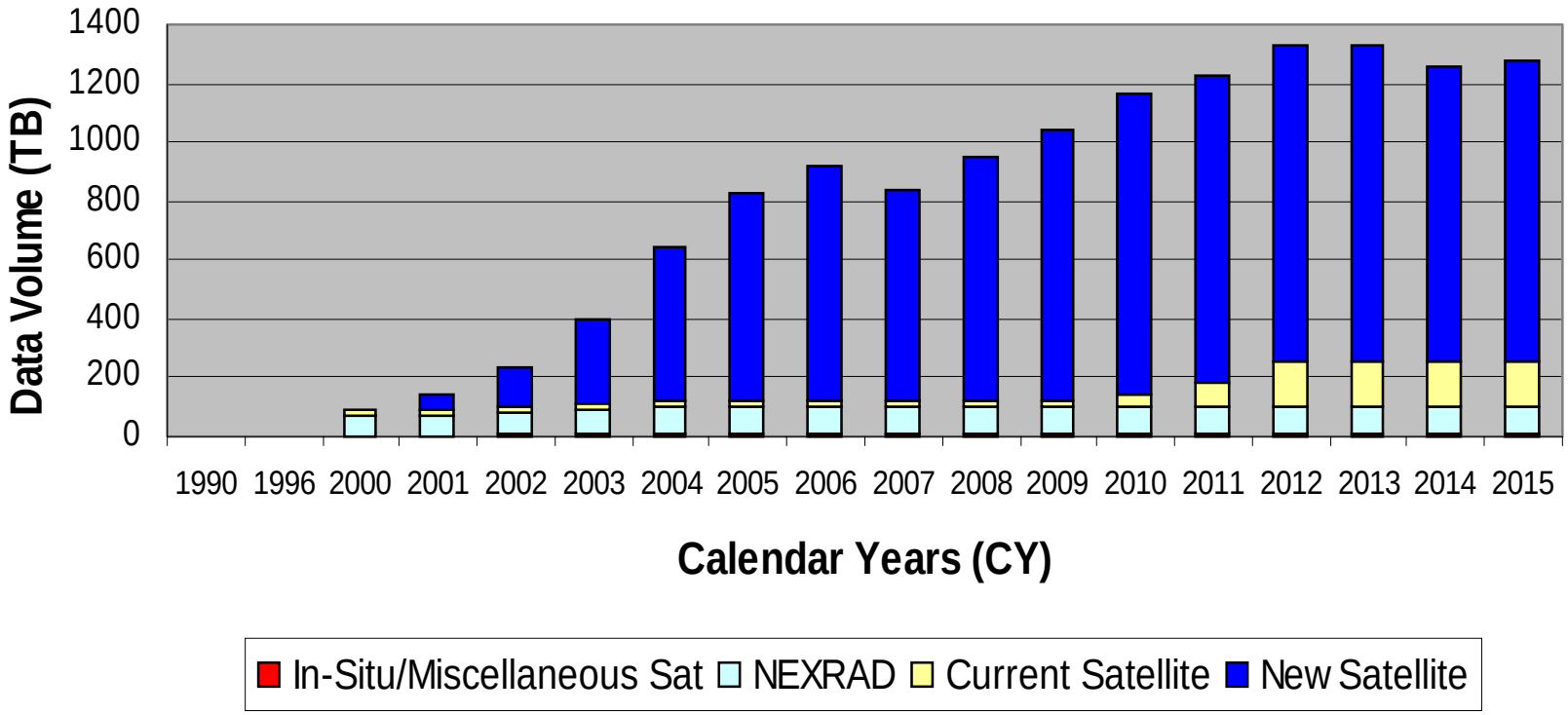




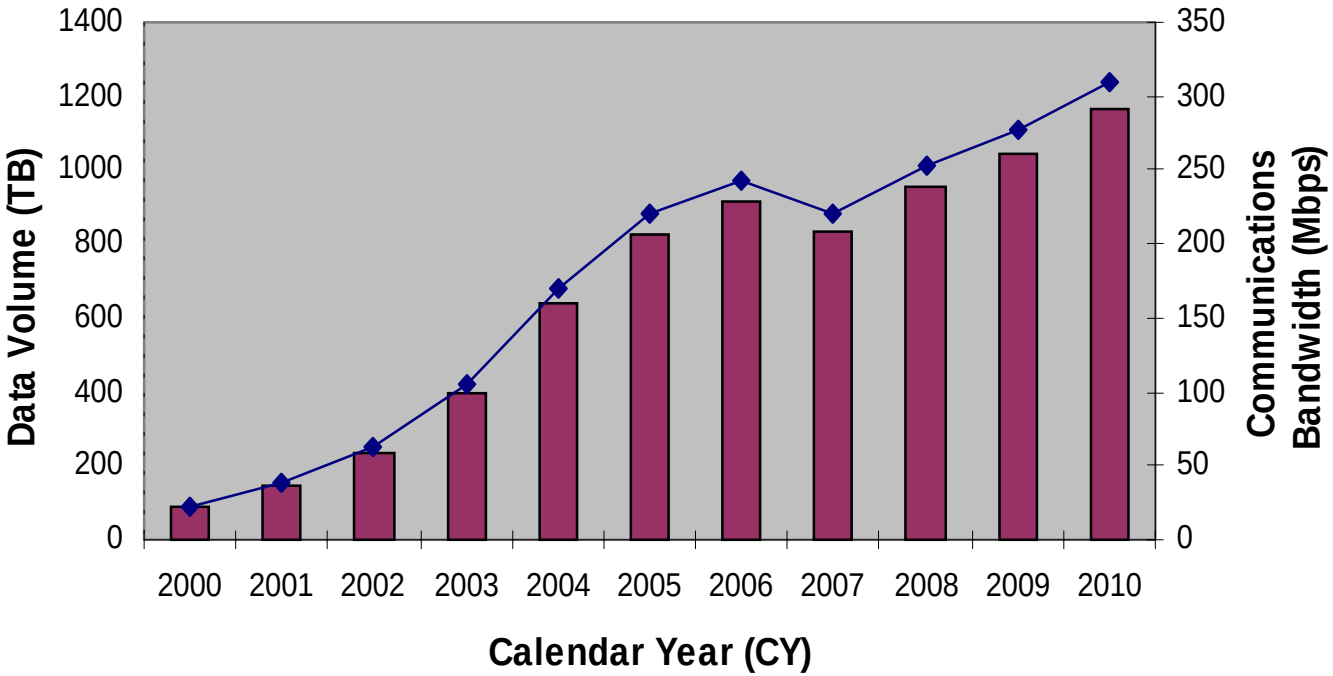


Projected Annual Data Ingest Volume (TB)

NOAA National Data Centers (NNDC)



Projected External Communications Requirements Supporting Projected Data Ingest Volume (TB)



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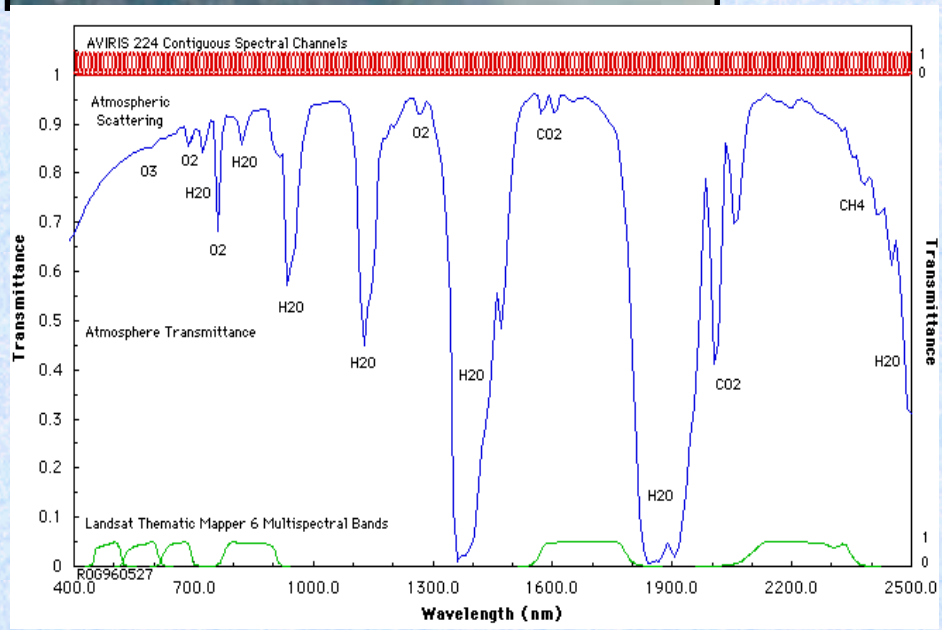
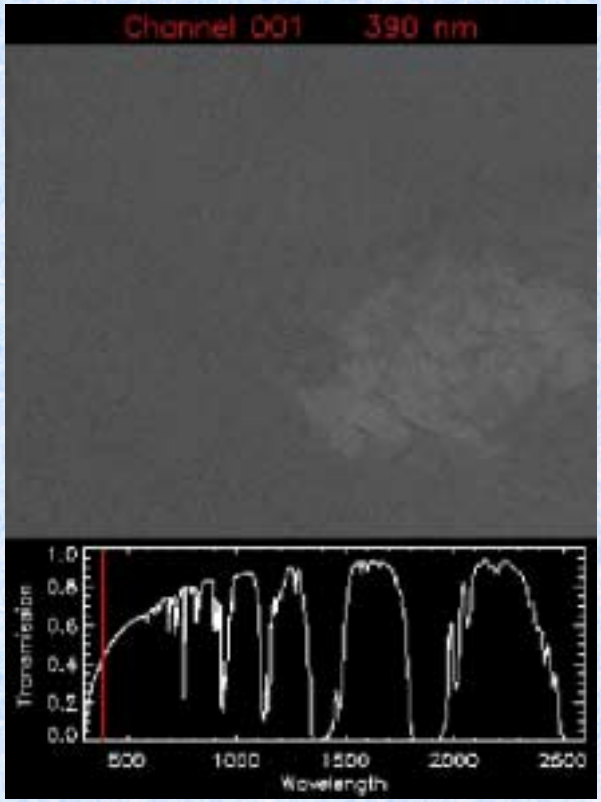
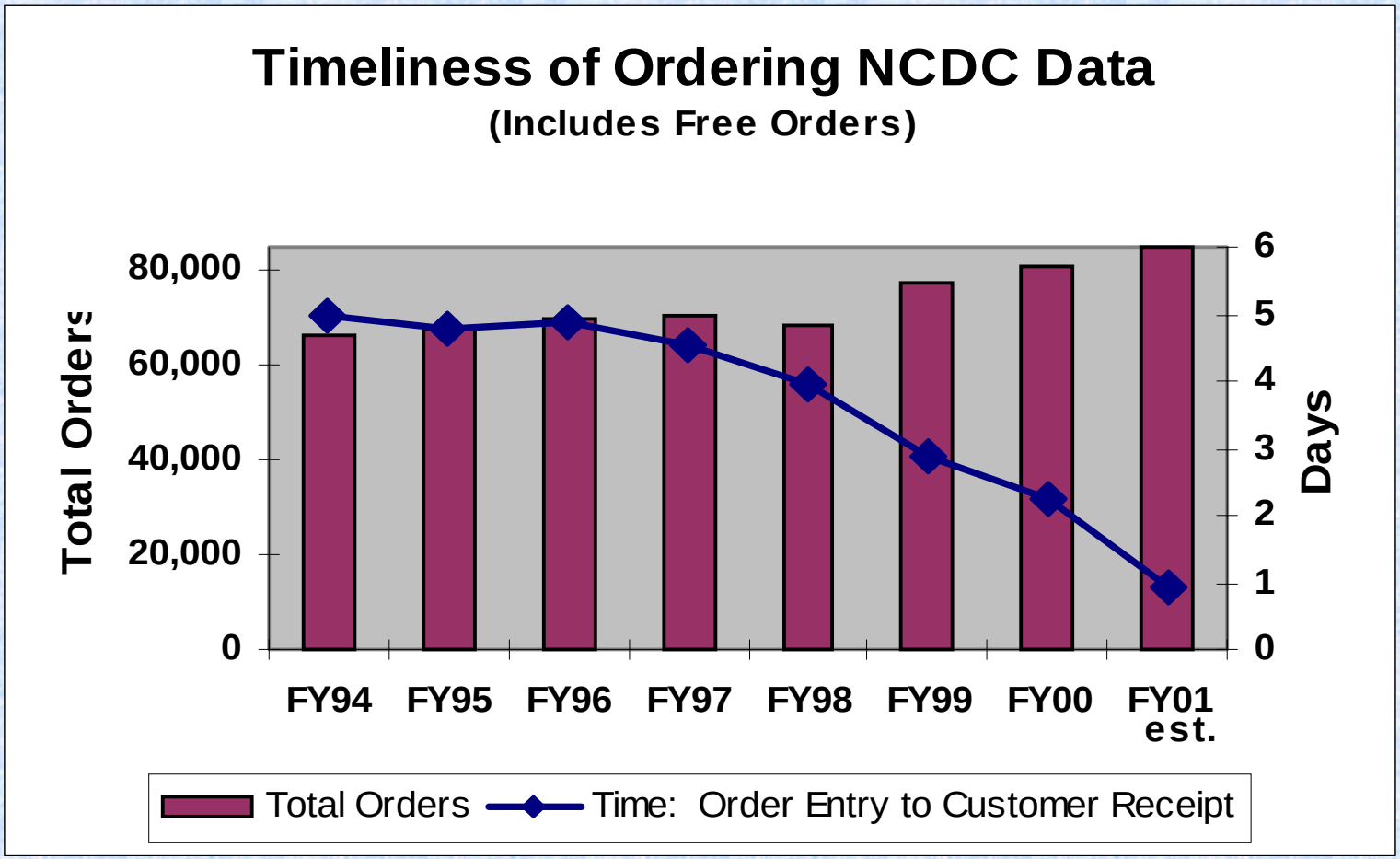
AVIRIS Image - Linden CA 20-Aug-1992, 224 Spectral Bands: 0.4 - 2.5 μm
Pixel: 20m x 20m Scene: 10km x 10km courtesy of Mike Griffin, MIT-LL





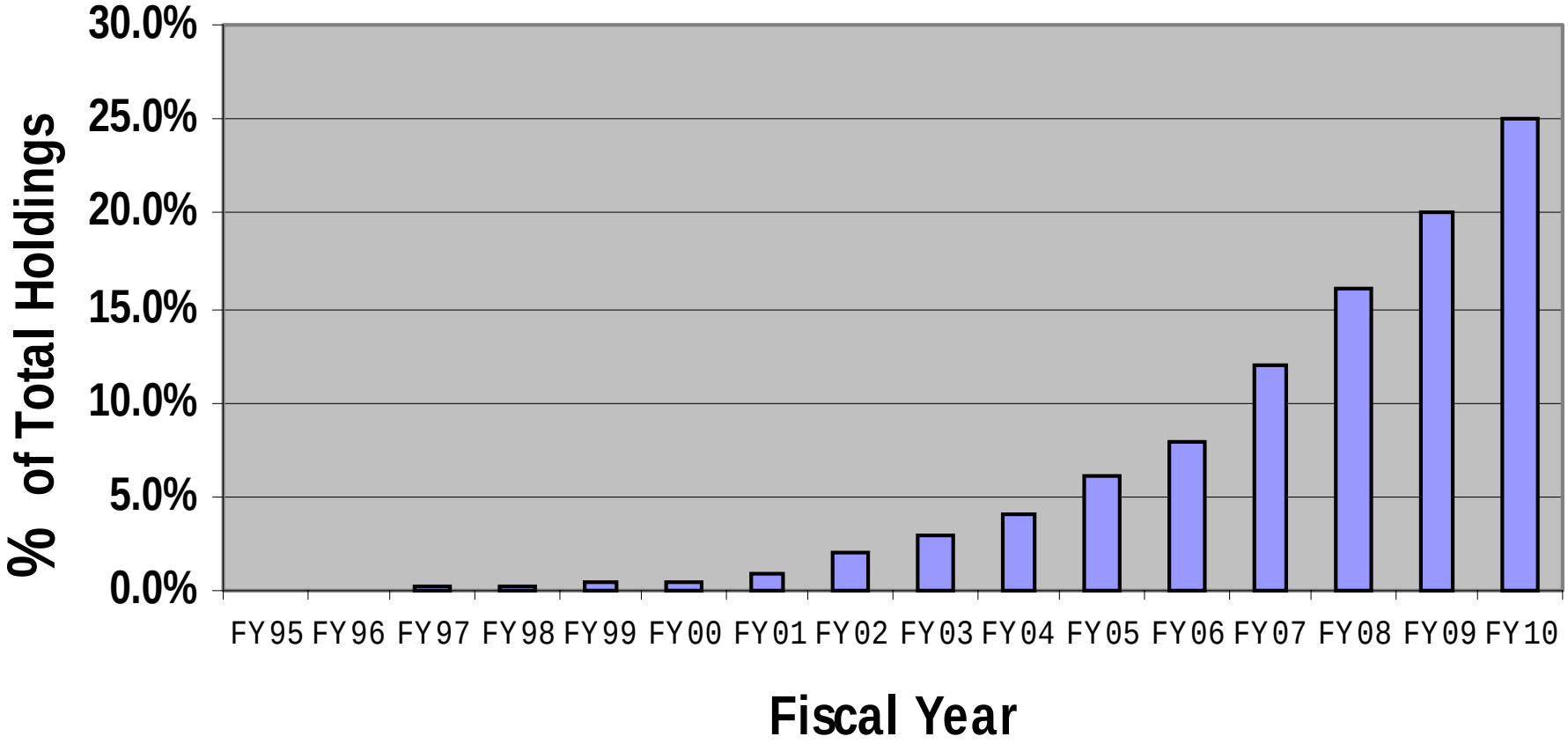
Customer Service

Improved Efficiency due to Web Access



Projected Percent of Data On-Line

NOAA National Data Centers



Challenges

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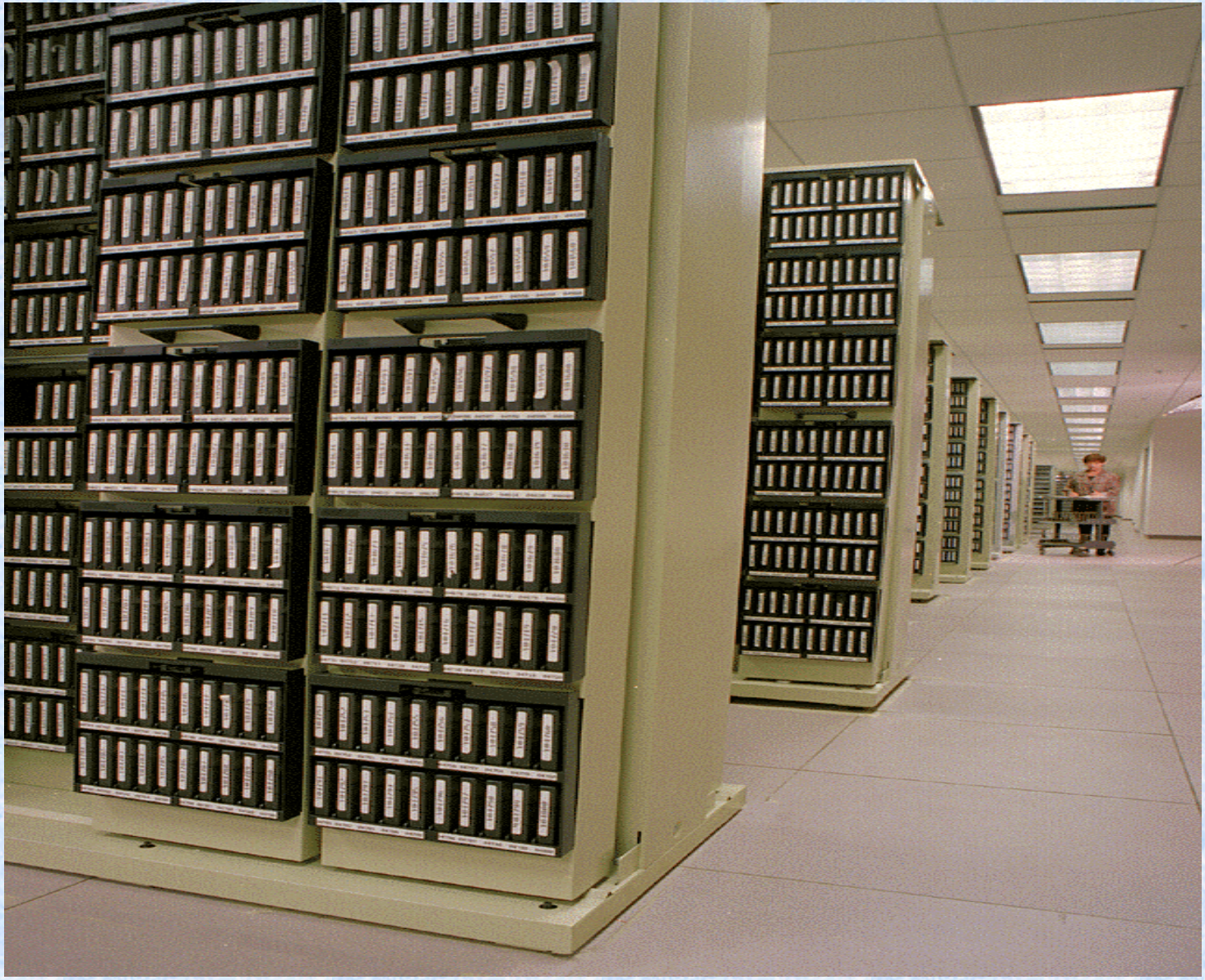
- **High-speed media migration**
- Reprocess large volumes
- Improve integration of environmental observation

Off-line Digital Data Archive



NNDC Digital Data Archive

Year 1990 Fill ~**100,000,000 Floppies (~130TB)**
Stack of Floppies **More Than 1 ½ times the Height** of the **Washington Monument**

Year 2000 Fill ~**1,700,000 CD-ROMs (~1,000TB)**
Stack of CD ROMs the Height of **5 Empire State Buildings**

Year 2010 Fill ~**3,800,000 DVDs (~15,000TB)**
Stack of DVDs the Height of **9 Petronas Towers**

Challenges

- Hard copy to electronic media
- Rapid ingest of observational data
- Rapid access to data
- High-speed media migration
- **Reprocess large volumes**
- Improve integration of environmental observation

MODIS Data from NASA TERRA Satellite – Mississippi Delta

Challenges

REPROCESSING MIGRATION

1990s Pathfinder Project (POES Data)

Total Input Volume:	4.5TB
Total Output Volume	8.8TB
Period of Record (POR):	1981-1999 (18 Years)
Time to Complete Reprocessing:	7 Months
Total Hours of Computing Time:	3,070 Hours

The Challenges

Year 2010 Reprocessing Project

Total Input Volume:	10,000TB
Total Estimated Output Volume	20,000+TB
Period of Record (POR):	2000 - 2010 (10 Years)
Time to Complete Reprocessing:	One Month
Total Hours of Computing Time:	Less Than 100 Hours

DATA MINING - LARGE VOLUMES IN A MATTER OF HOURS

Challenges

- Hard copy to electronic media
- Rapid ingest of observational data
- Rapid access to data
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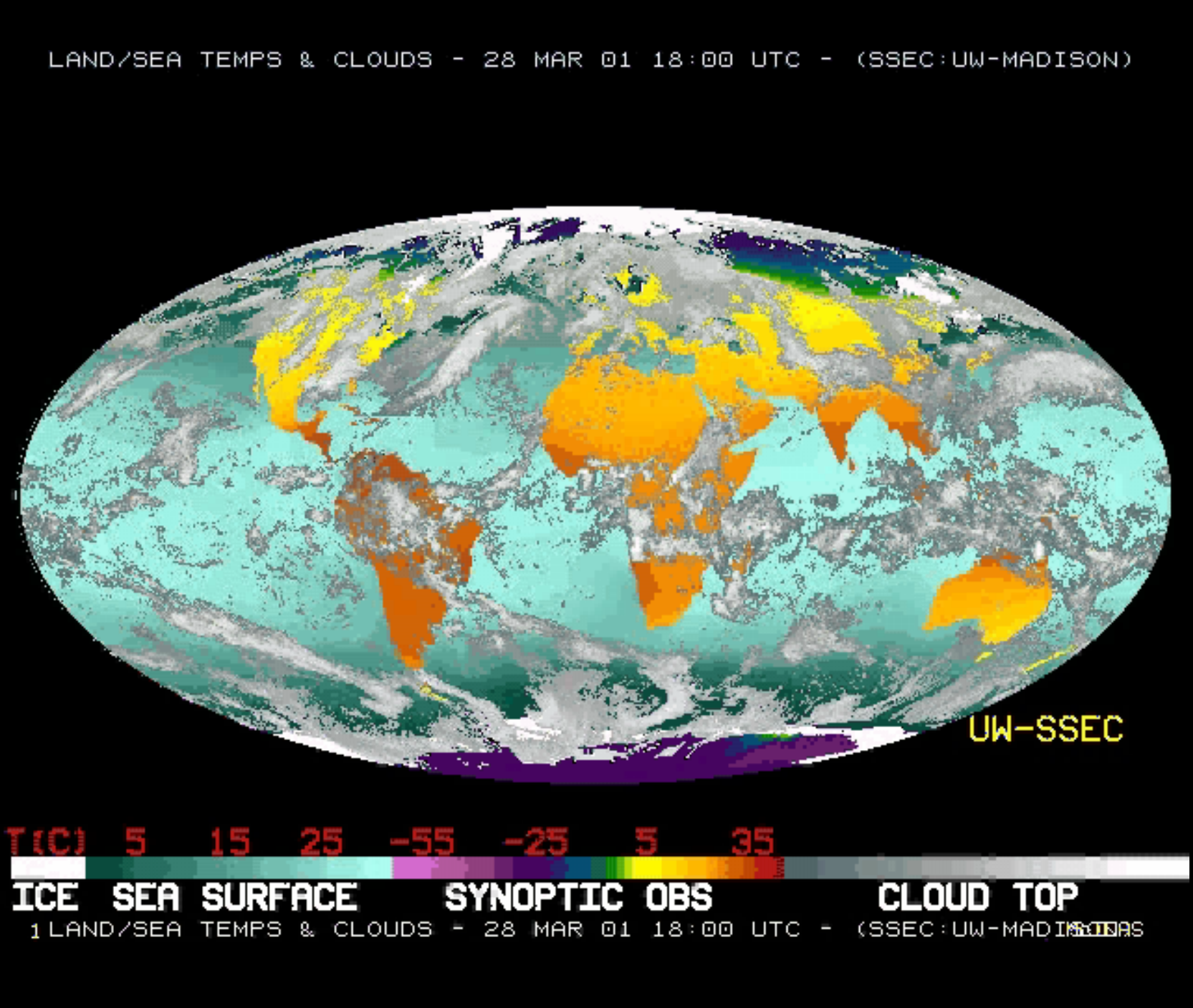
- Reprocess large volumes

➢ **Improve integration of environmental observation**


LAND/SEA TEMPS & CLOUDS - 28 MAR 01 18:00 UTC - (SSEC:UW-MADISON)
UW-SSEC
T(C) 5 15 25 -55 -25 5 35
ICE SEA SURFACE SYNOPTIC OBS CLOUD TOP
1 LAND/SEA TEMPS & CLOUDS - 28 MAR 01 18:00 UTC - (SSEC:UW-MADI

Help NOAA in making our environmental data accessible for:

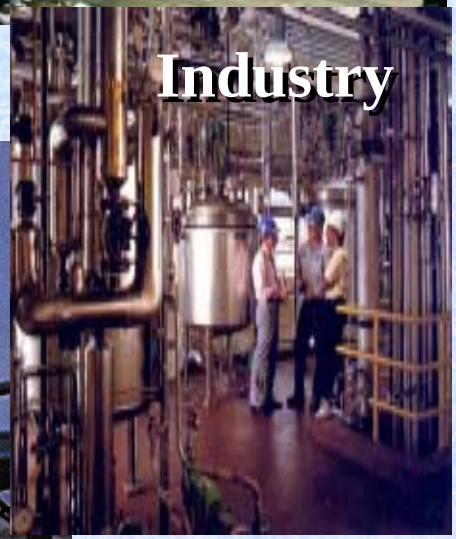
Climate

Commerce

Defense

Agriculture

Transportation



Industry

Backups

Unique Role of NOAA's National Data Centers

- Acquire environmental data from U.S. and foreign sources
- Preserve the Nation's environmental data assets
- Assemble data into easy to use long-term data sets
- Provide access to environmental data for business, federal and science users
- Describe the environment

Summary

- Challenges identified in paper/film migration, ingest, access, migration, reprocessing, and data fusion
- If we meet these challenges, NOAA can enable more quickly breakthrough in understanding, predicting, and assessing the impact of environmental changes
- Our goal is to enable these breakthroughs as soon as possible after the observations are taken, and not to force the community to wait 50 more years while we get our data act together
- With the help of you, the new economy pioneers, we will meet these challenges

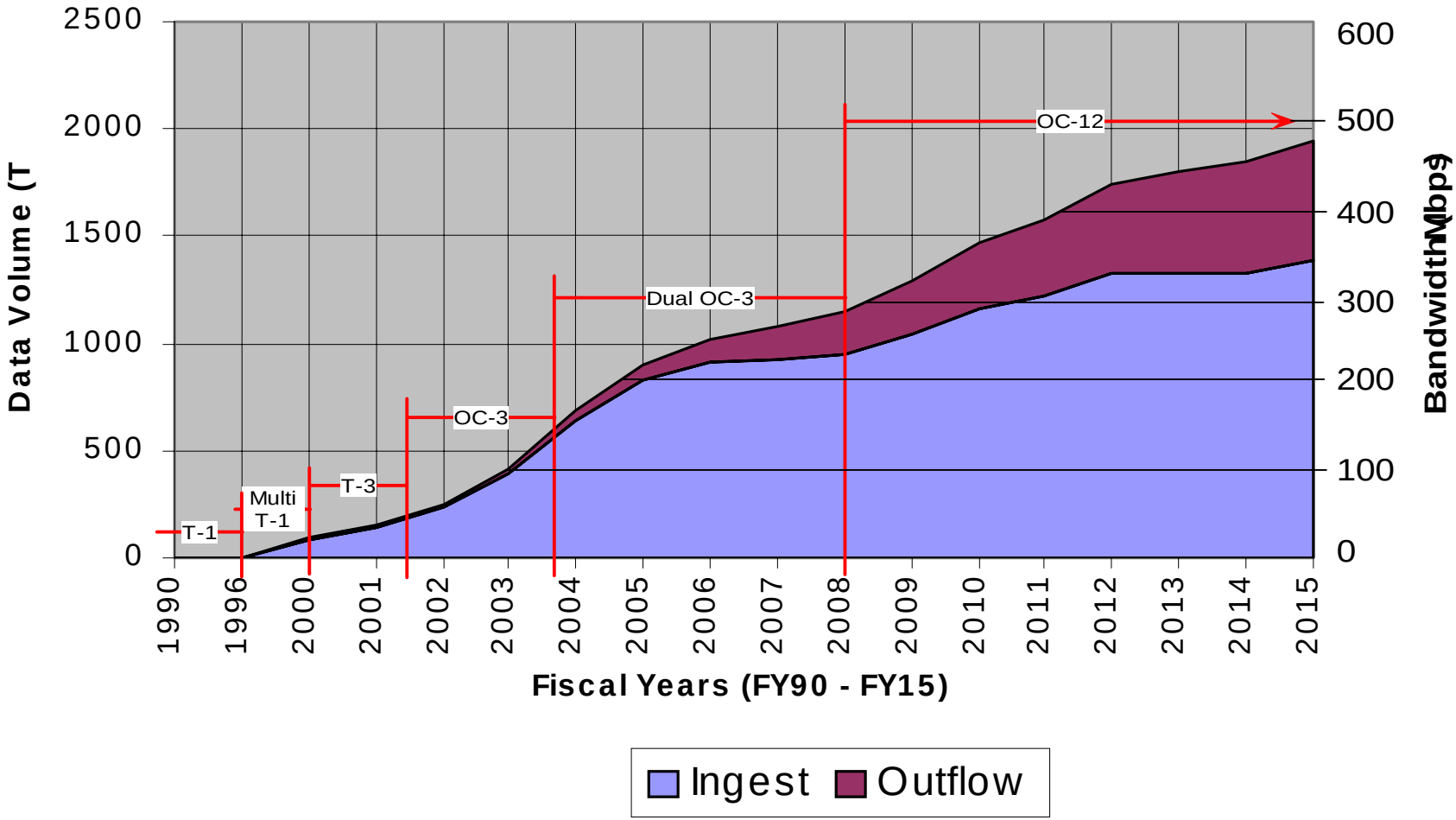
Challenges

MEDIA MIGRATION

Time Frame	No. Tapes Migrated (Variety Types on Racks)	Volume Migrated	Ratio
1991 - 1996	**100K**	**100GB**	**1 : 1**
{From 9 Track, 3480, & Other To 3480 on Tape Racks}			
2000 - 2005	**300K**	**600TB**	**1:30+**
{All Remaining Off-Line Tape Racks - Mostly From 3480 and 8mm (NEXRAD), U-Matic (GOES) To 3590E on Robotics Tape System. Started in 1999, ~ 100K completed, ~ 60TB, Average Rate 200GB - 500GB/Day. Data Compression can increase ratio considerably}			
2010 - ???	**30,000K**	**1.2PB**	**???**

Projected Total External Communications Volume

National Climatic Data Center



Projected Cumulative Data Archive Volume (TB)
(includes Backup Copies)
NOAA National Data Centers (NNDC)