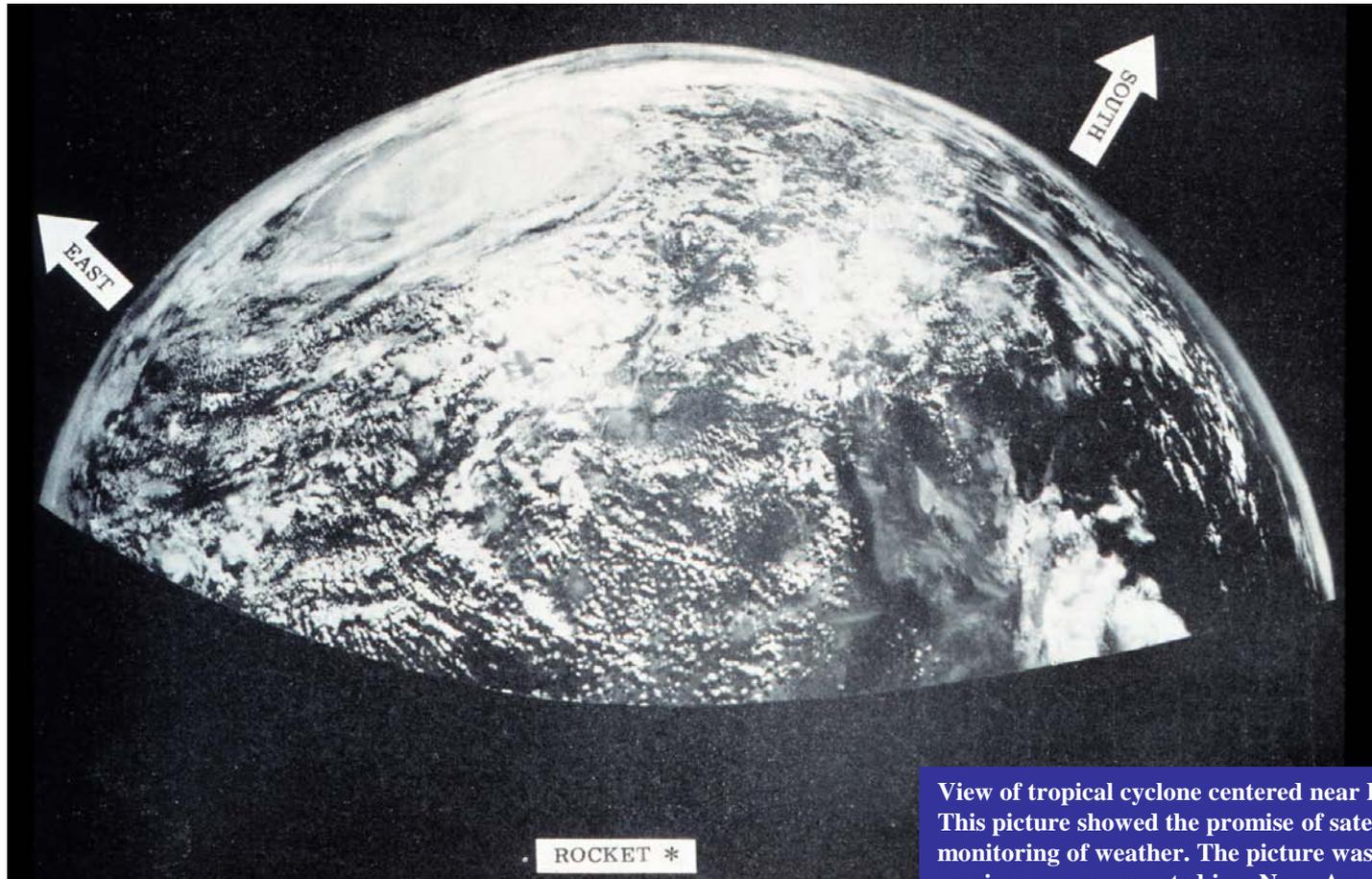


Overview of *Earth System Research Laboratory*



View of tropical cyclone centered near Del Rio, Texas. This picture showed the promise of satellite monitoring of weather. The picture was made from movie cameras mounted in a Navy Aerobee rocket fired from White Sands Proving Ground. Monthly

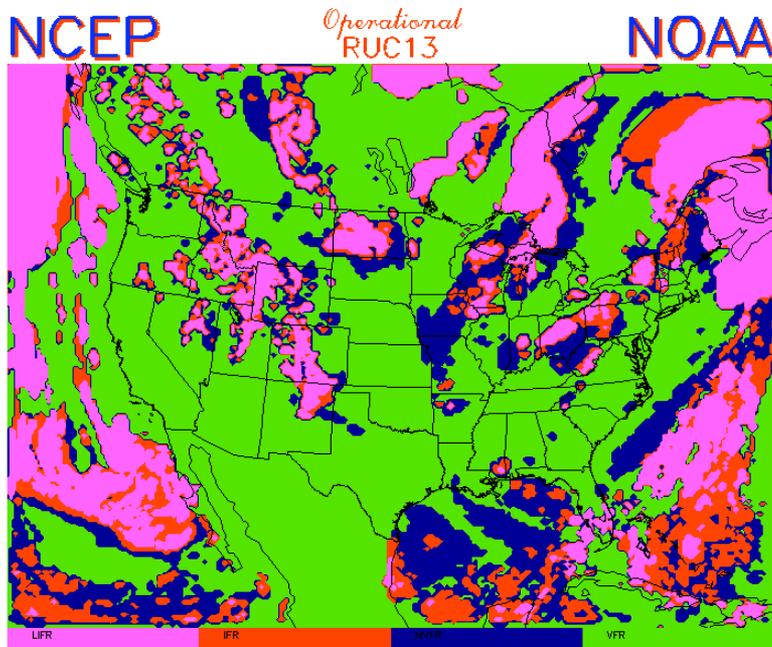
Weather Review, June 1955, p. 121.

Photo Date: October 5, 1954

John Schneider
Deputy Director for Research
NOAA Earth System Research Laboratory

ESRL Overview Summary

1. NOAA and relationship to the Earth System Research Laboratory (ESRL)
2. End-to-End “Mission Directed” Research
3. Key Areas of ESRL Research



Aviation Flight Rules (Experimental – Not for operational use!)
12-hr fcst valid 06-Mar-08 03:00Z

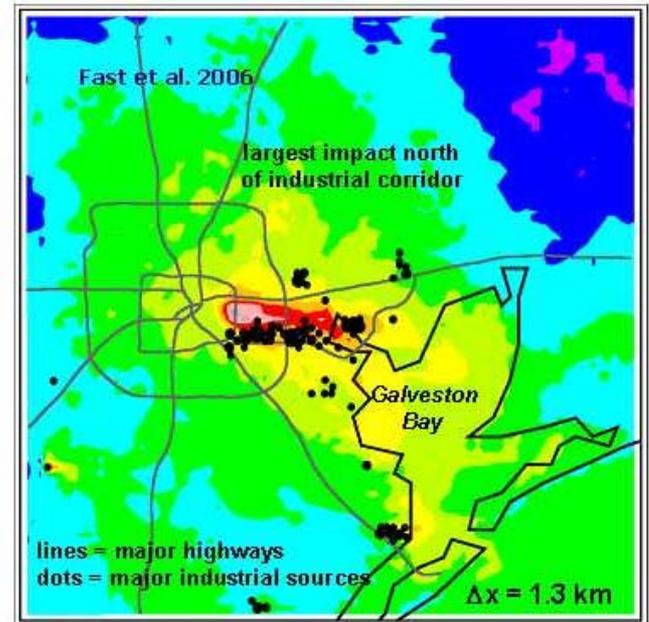
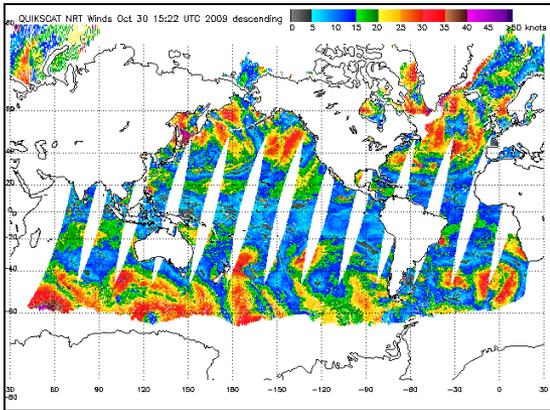
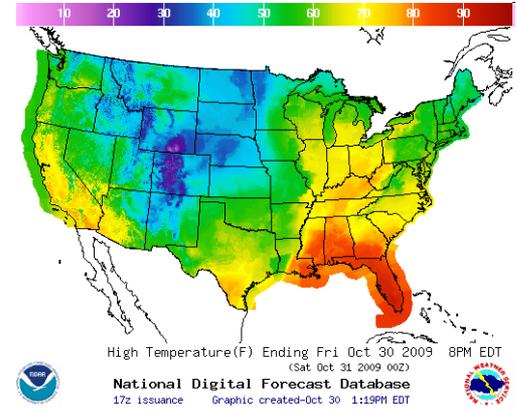


Image from Weather Research Forecast Model – Chemistry (WRF-Chem)



National Marine Fisheries Service



National Weather Service

National Environmental Satellite, Data, and Information Service

Office of Oceanic and Atmospheric Research

Office of Program, Planning and Integration



National Ocean Service



Earth System Research Laboratory

- Established in October 2005
- 4 Divisions and Office of Director
- Approximately 600 staff and affiliates made up of Federal, Cooperative Institute, contractor, and guest workers
- ~ \$95M in new funds each year
- New Funds:
 - 37% Direct Appropriations
 - 39% from Other NOAA Appropriations
 - 22% Non-NOAA (Other Fed, Private Sector, International)
- 6 locations (99% of staff in Boulder)
- Team is made up of about:
 - 265 Federal Staff
 - 255 University Employees
 - 80 Contractors
- Major University affiliations with:
 - University of Colorado – Boulder
 - Colorado State University



Science on a Sphere
EU Celebration at the Embassy of France
Washington DC, Dec 2008

Earth System Research Laboratory



SOS at the National Zoo - Photo Credit, Byunghwan Lim, ESRL

Mission:

To observe and understand the Earth system and to develop products through a commitment to research that will advance NOAA's environmental information and service on global-to-local scales.

ESRL develops scientific understanding and new technology and shares it with the world.



“End to End” Earth System Science

ESRL Strengths

Physical
Phenomena

Observations

Scientific
Study

Analysis
Model

Prediction
Model

Societal
Benefits



Health



Disasters



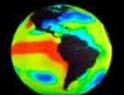
Weather



Energy



Water



Climate



Agriculture



Ecosystems



Oceans

Understanding Earth Processes

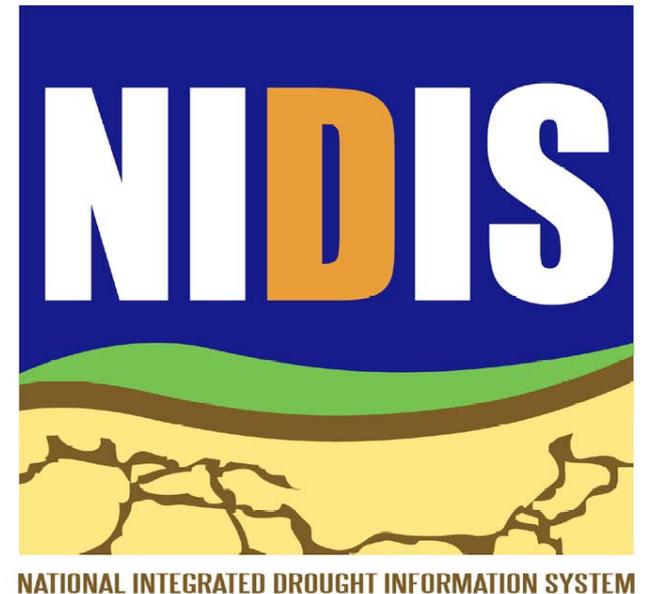
Development and Operations of New Observing Systems

Developing Forecast and Prediction Methods

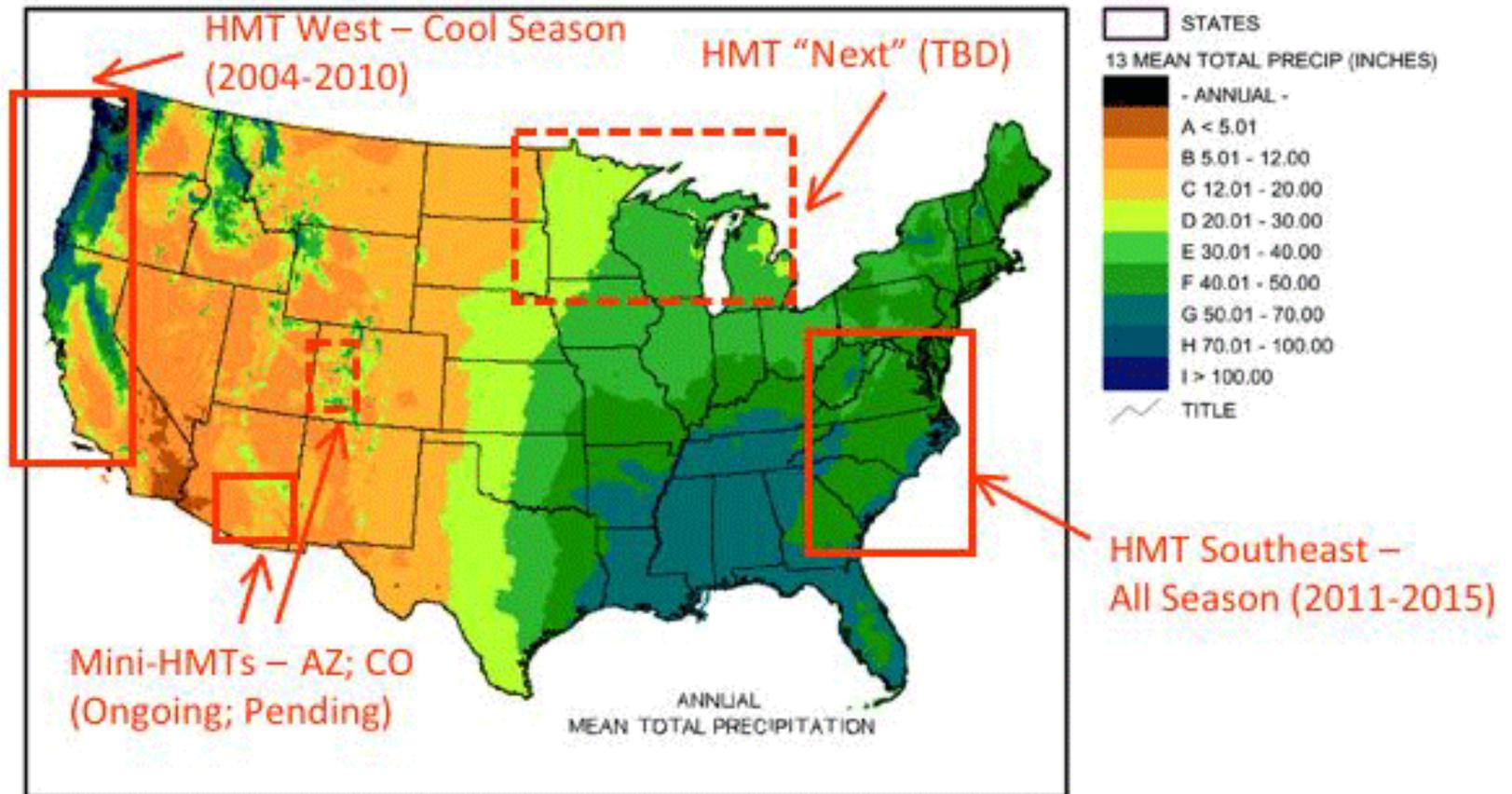
Developing Tools for Use by Decision Makers

Understanding Earth Processes

- Arctic Observations and Research
Aerosol, Radiation, and Cloud Processes
affecting Arctic Climate (ARCPAC)
- Flood and Drought Research
National Integrated Drought Information System
Western Water Assessment
- Air Chemistry and Aerosol Research
- Weather Understanding and Prediction
Hydrometeorological Testbed (HMT) 2009



HMT: A National Testbed Strategy with Regional Implementation



Development and Operations of New Observing Systems

Observing Systems

Atmospheric Baseline Observatories
Arctic Atmospheric Observatories
Boundary Layer Wind Profiler Network
Global Positioning System – Meteorology Network
Surface Radiation Budget Network (SURFRAD)



ESRL's Barrow Observatory

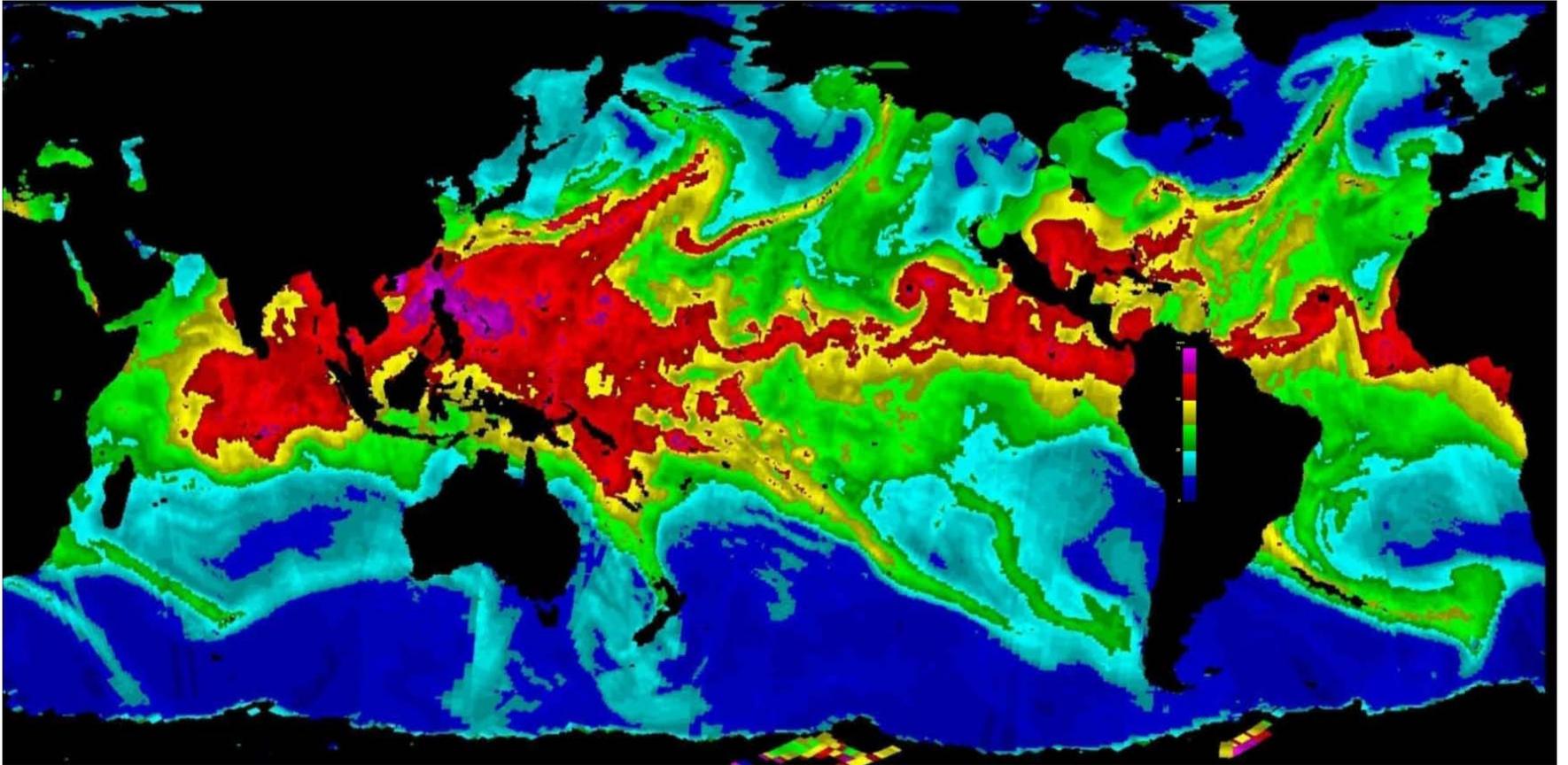


NOAA Illustration

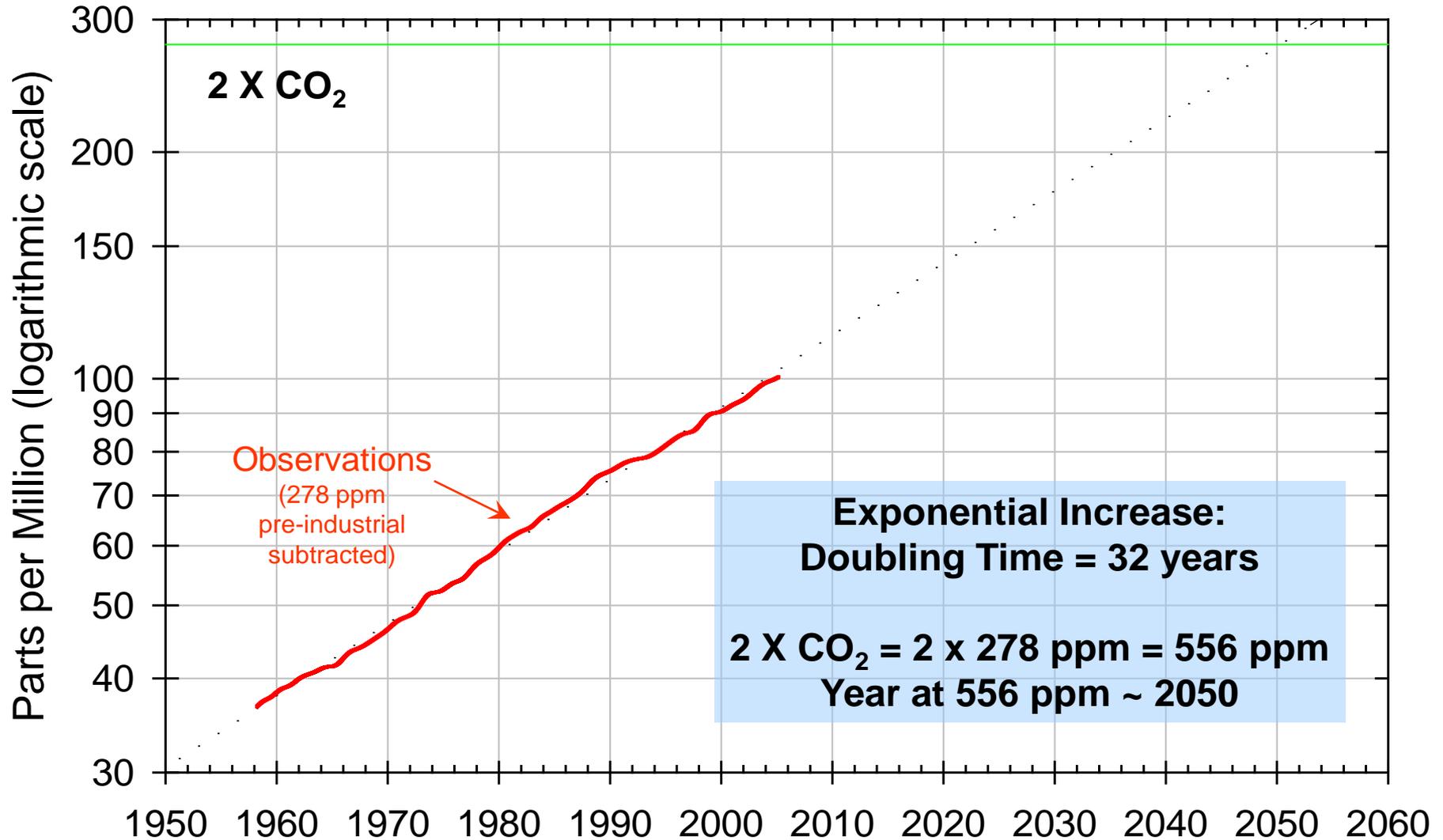
Observation System Development

Unmanned Aircraft Systems
Precision Measurement of Air Constituents
Boundary Layer Wind LIDARS
Ultra-Light Drones

Global Total Precipitable Water



Mauna Loa De-Seasonalized Post-Industrial Carbon Dioxide



Developing Forecast and Prediction Methods

Global, Regional, and Local Modeling and Forecasts

Data Assimilation Systems

- Enhanced Kalman Filter (EnKF)
- Space Time Mesoscale Analysis System (STMAS)

Global Models:

- FIM Flow-following- finite-volume Icosahedral Model
- NIM – Non-hydrostatic FIM

Regional Models:

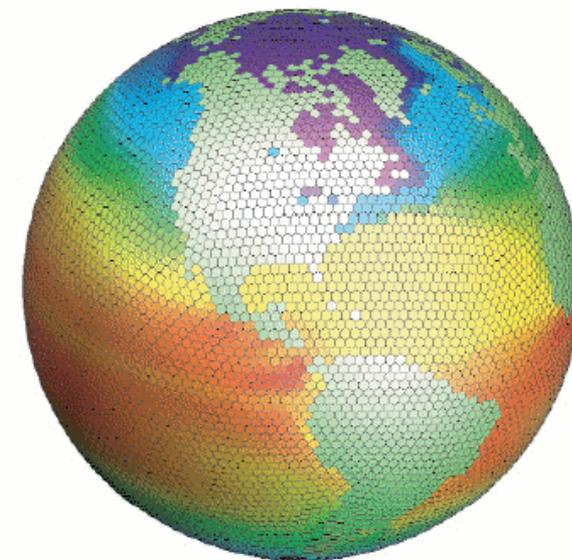
- Rapid Update Cycle (RUC)
- RUC – Air Chemistry
- High Resolution Rapid Refresh (HRRR)

Local Models:

- Local Area Prediction System (LAPS)
- Precision Airdrop System (PADS)



PADS Targetted Airdrop



FIM

Research Programs

Hurricane Forecast Improvement Program (HFIP)

- Enhance hurricane track and intensity forecast

Developmental Testbed Center DTC

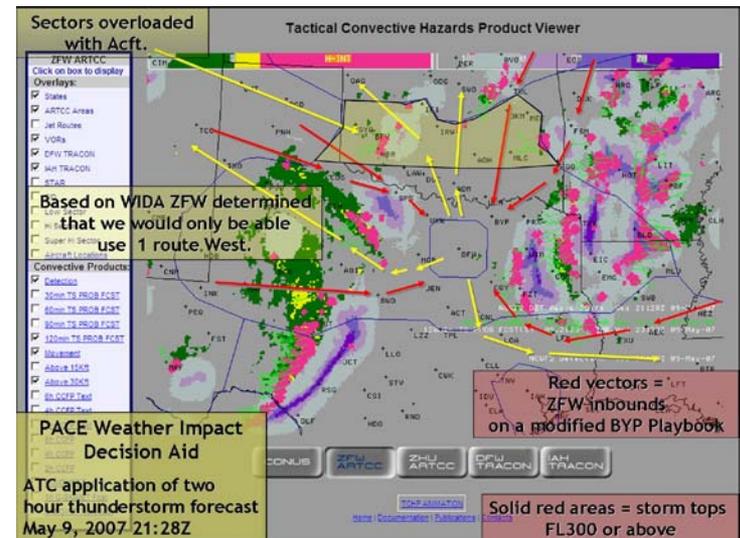
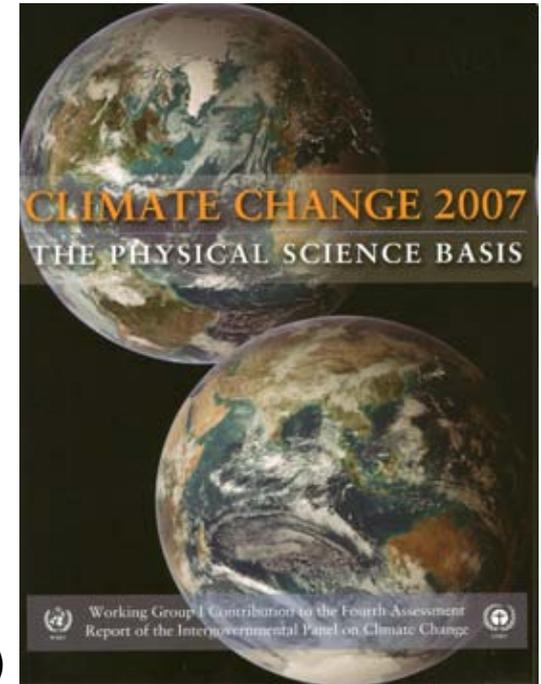
Developing Tools for Use by Decision Makers

Assessments

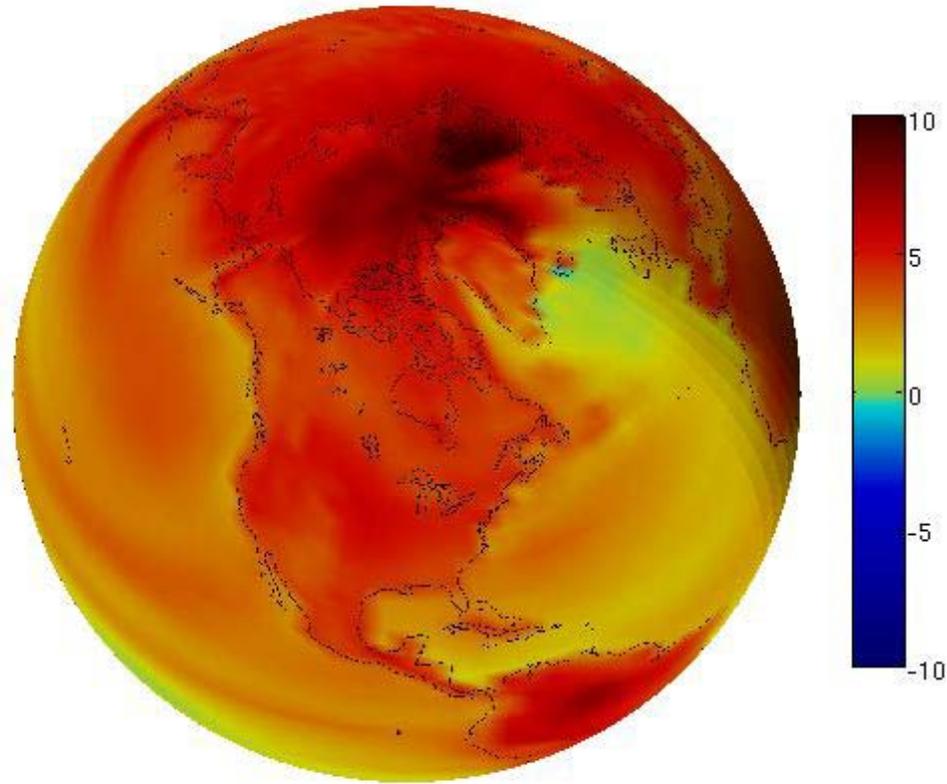
Intergovernmental Panel on Climate Change (IPCC)
Montreal Protocol – Ozone Depleting substances

Visualization and Quality Enhancement Tools

Advanced Weather Interactive Processing System (AWIPS)
Next Generation Weather Forecast System
FX-Net (internet based weather forecast interface)
FAA Decision Support Tools
Volcanic Ash Coordination Tool (VACT)
Real-time Verification System (RTVS)
Carbon Tracker
Geo-targetted Alerting System (GTAS)



Model projection for 2100



Continents Warm 50% more than oceans

GFDL Climate Model

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Deputy Director for Research
NOAA Earth System Research Laboratory

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