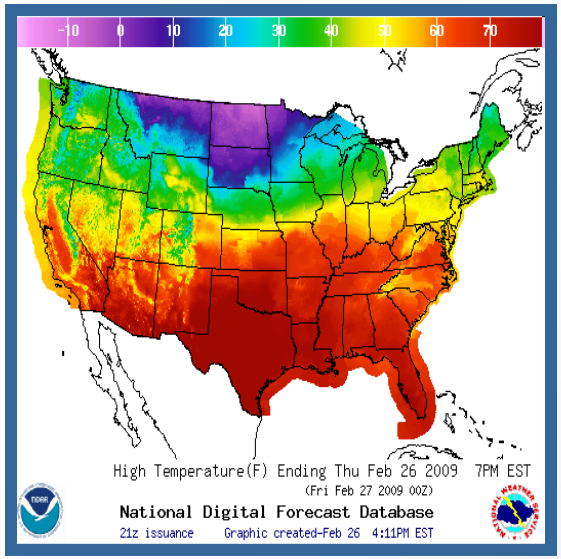
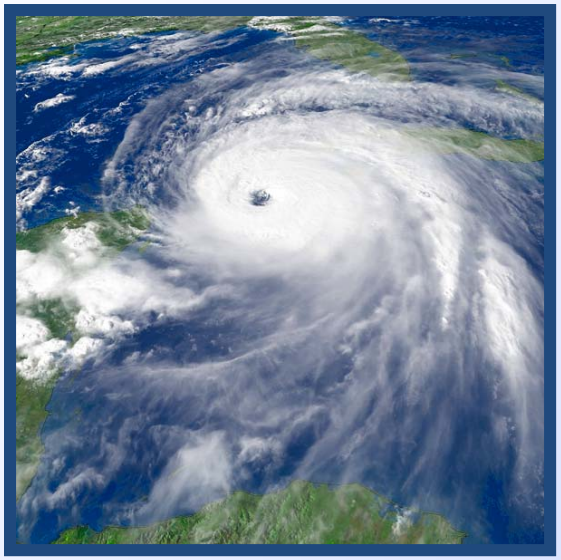
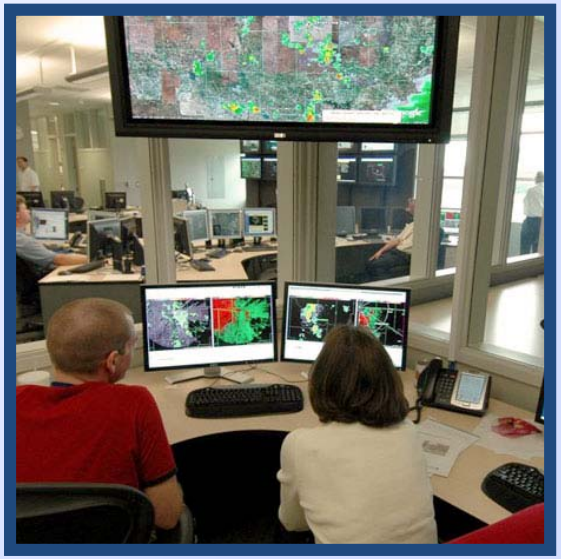






National Oceanic and Atmospheric Administration
National Weather Service

The Role of the GPM for the NWS

Laura Furgione
Deputy Director
Third GPM Workshop
College Park, MD
April 2, 2013

Why GPM ?

- Precipitation estimation and prediction are critical to creating a Weather Ready Nation
- Precipitation and its derivatives impact
  - Industries
    - Agriculture, Transportation, Energy, Recreation
  - Government Agencies and Decision Makers
  - Communities and Individuals
  - Ecosystems

Where NWS Will Use GPM

- Numerical Weather Prediction
  - Central guidance
- NWS Service Center Products
- NWS Local Forecasts and Warnings
  - Weather Forecast Offices
  - River Forecast Centers

Numerical Weather Prediction: Everything you read, see or hear about weather, climate and ocean forecasts begins with NWP models

Three Major Components of the Numerical Prediction Enterprise

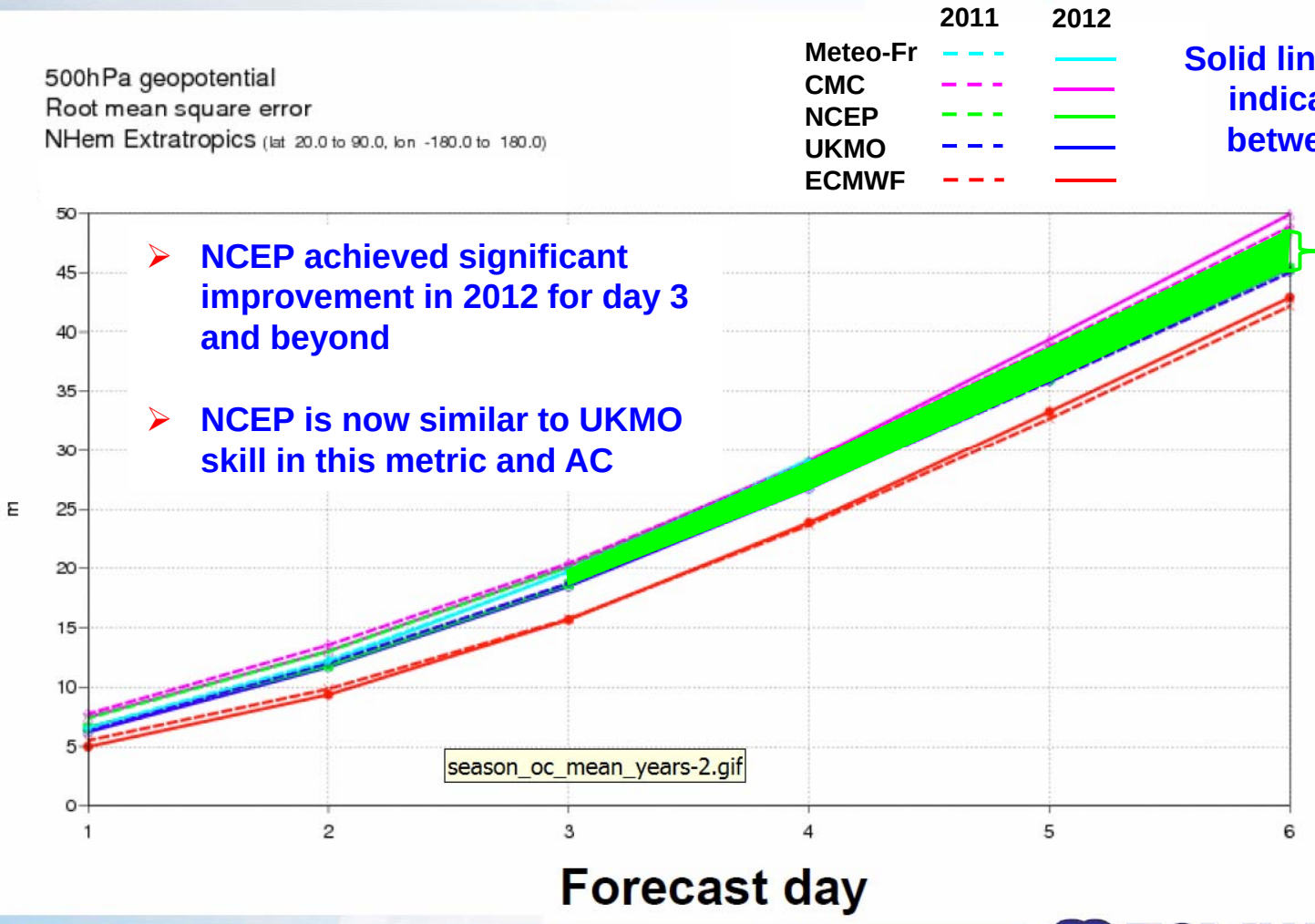
- Global Observing System
- Computers (supercomputers, work stations)
- Data Assimilation & Modeling/Science



Impact of NCEP's Hybrid Data Assimilation

June, July, August 500hPa Geopotential RMSE

Comparison with other forecasting centres



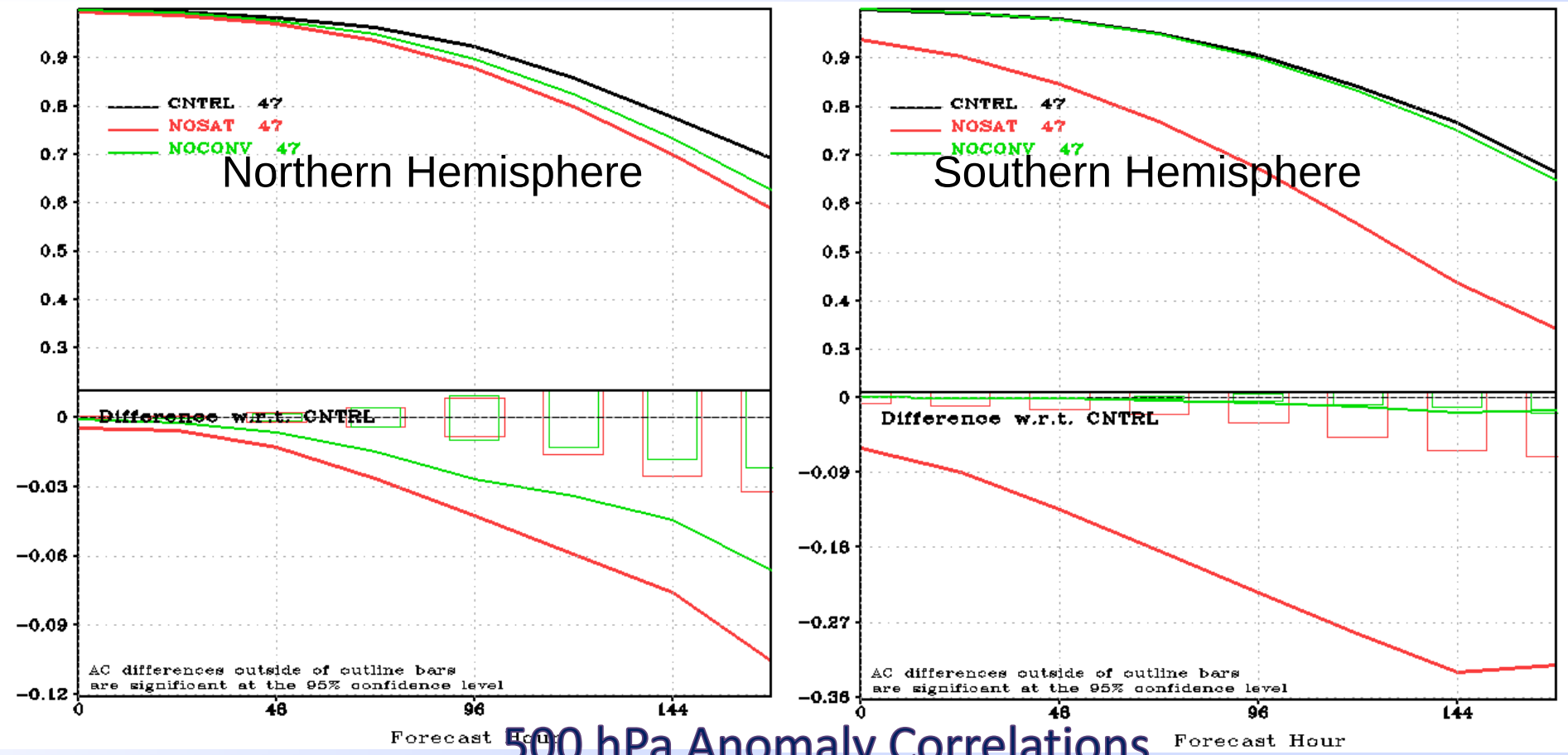
- NCEP achieved significant improvement in 2012 for day 3 and beyond
- NCEP is now similar to UKMO skill in this metric and AC

Solid line lower than dashed indicates improvement between 2011 and 2012

NCEP Only System to show improvement between 2011 and 2012

Importance of Satellite Data

No Satellite / No Conventional Data



500 hPa Anomaly Correlations

15 Aug – 30 Sep 2010

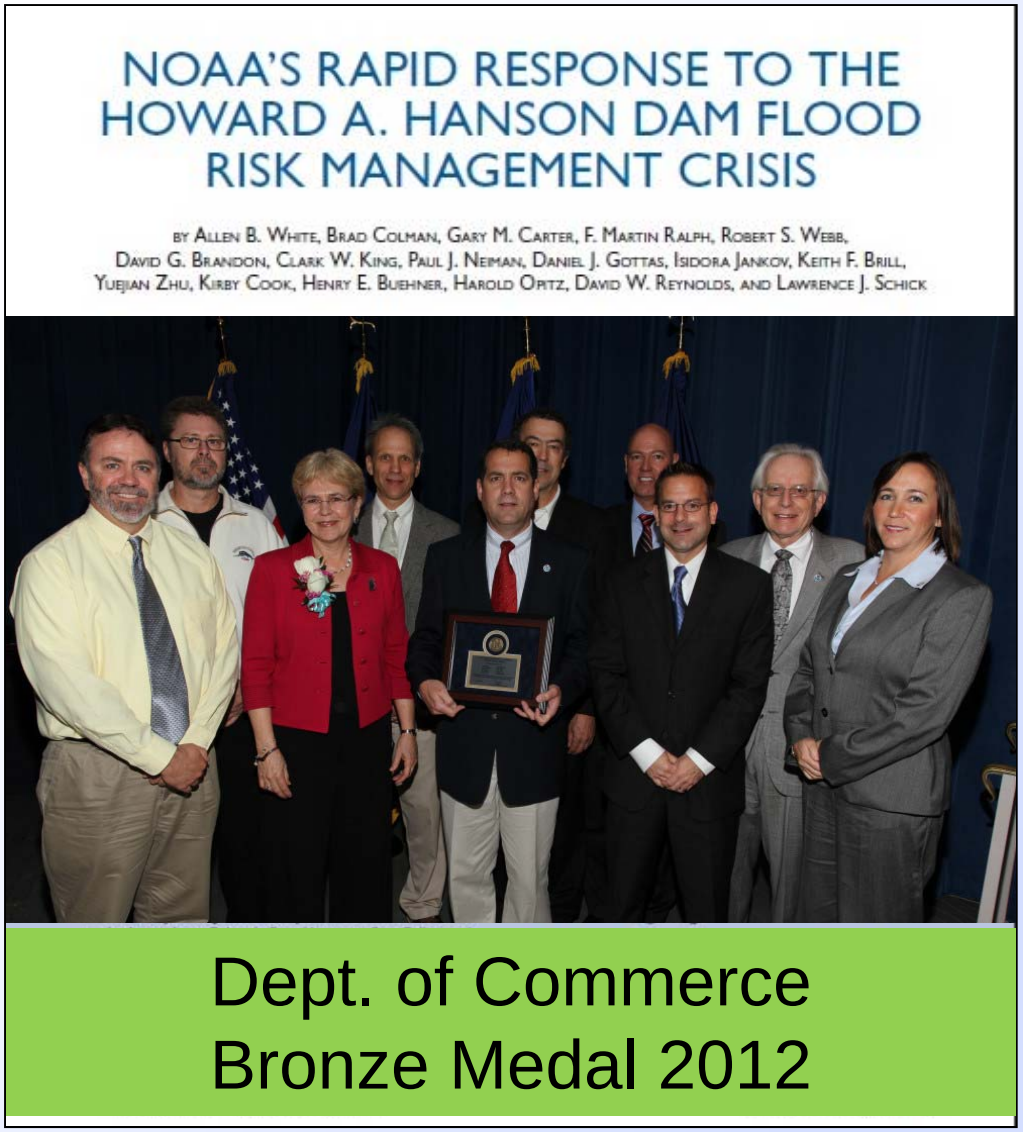
Numerical Weather Prediction

- NCEP's Global Forecast System relies most heavily on satellite data for input
  - Satellite data affected by precipitation
    - Are associated with some of the most critical weather
    - But are challenging to assimilate for NWP
  - The Joint Center for Satellite Data Assimilation identifies use of data affected by clouds and precipitation as a science focus.
  - GPM's active radar capability may prove to be a key addition to the Observing System for NWP

GPM at NCEP Service Centers

- Quantitative Precipitation Estimates (QPE) needed by:
  - Weather Prediction Center
  - National Hurricane Center
    - Inland flooding causes largest loss of life
  - Climate Prediction Center
- GPM will augment current multi-sensor QPE
  - To move GPM data from Research to Operations, take advantage of existing Testbeds and Proving Ground Model

HMT-West innovations were key elements in NOAA's rapid response to a flood risk crisis

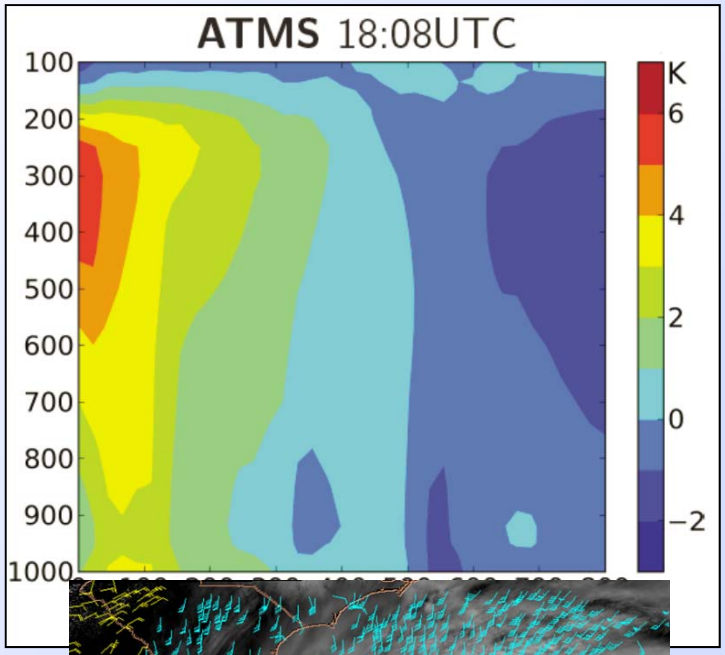


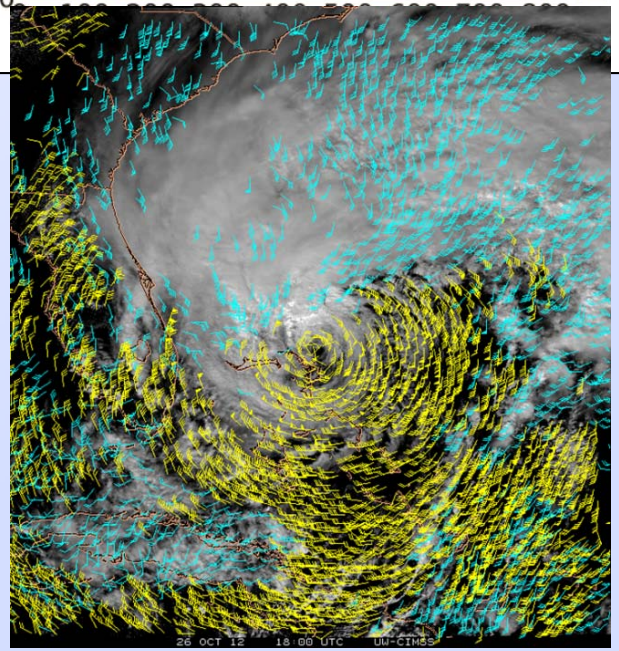
Dept. of Commerce
Bronze Medal 2012

- USACE was considering taking over operation of a dam in Washington State during a recent storm.
- Using the HMT ARO at the coast and NWS forecasts, USACE saw the back edge of the AR was coming ashore and thus heavy rain was about to end, so they did not take over operation from the local water agency.
- See recent journal article by White et al. (February 2012; Bulletin of the American Meteorological Society).

Example: Hurricane Forecasting

- National Hurricane Center's biggest forecast challenge is rapid intensity change
- New satellite data will be used to improve Tropical Cyclone intensity forecast models
  - Sounding data from ATMS and CrIS
  - High res Atmospheric Motion Vectors (AMV winds) from GOES-R
  - GPM QPE

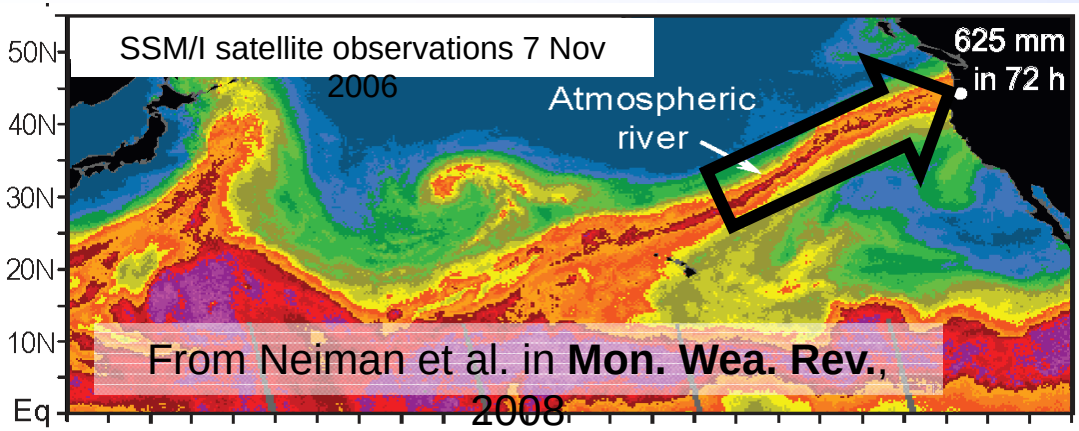


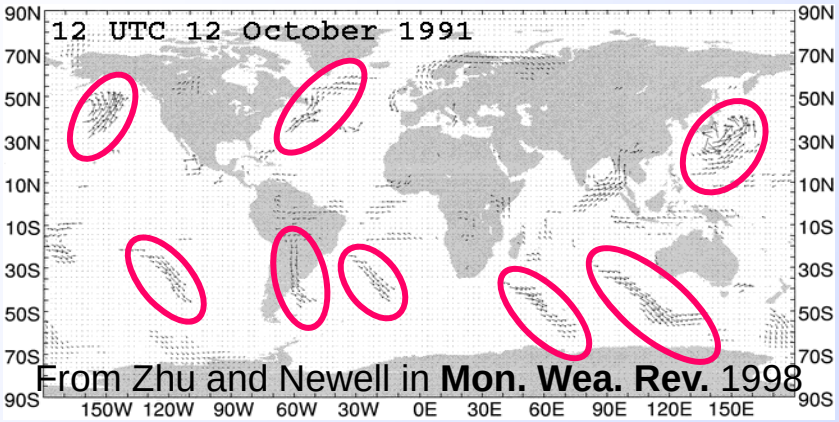


GPM for Forecasts & Warnings

- Improved Numerical Weather Prediction
  - Increased confidence in NWP via improved verification
- Improved derived products for analyses and outlooks at River Forecast Centers and Weather Forecasts Offices
- Goal is to provide longer lead times for flood warnings and water management decisions

Example: Atmospheric Rivers





ARs are narrow region of strong winds and large amounts of water vapor.

These regions provide the "fuel" (water vapor) for sometimes heavy rain or snow



ARs are narrow regions in the atmosphere that perform >90% of the water vapor transport in earth's mid-latitudes. They move with larger storms, and on average there are only 3-5 ARs per hemisphere at once

GPM and Atmospheric Rivers

- Augment other observing systems to detect ARs and quantify the resulting precipitation
  - Including DOD Special Sensor Microwave Imager/Sounder (SSMIS)
  - Surface-based GPS Total Precipitable Water vapor sensors
  - Surface-based radars
- Contribute to more accurate forecasts
- Contribute to the verification of AR forecasts

- Predicting the location and precipitation potential of atmospheric rivers can help provide longer lead times for those issuing flood warnings and other decision makers

Summary

- GPM offers a (largely) unique and complementary type of observation of precipitating systems, and thus:
- Holds promise of improved estimations and predictions of precipitation and derived products for the NWS
- Challenge will be to learn how to use this data most effectively in concert with other observations (in situ, radar, GPS TPW, and satellite)
- Charge to the Workshop is to develop the most effective teams and plans using expertise of NOAA, NASA, and other partners and collaborating with existing Testbeds, Proving Grounds, and NWS Office of Hydrological Development (OHD)

Thanks for helping create a Weather Ready Nation!