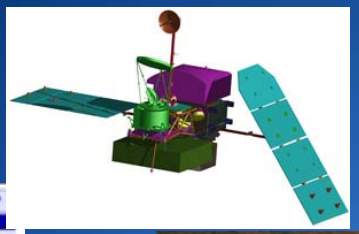
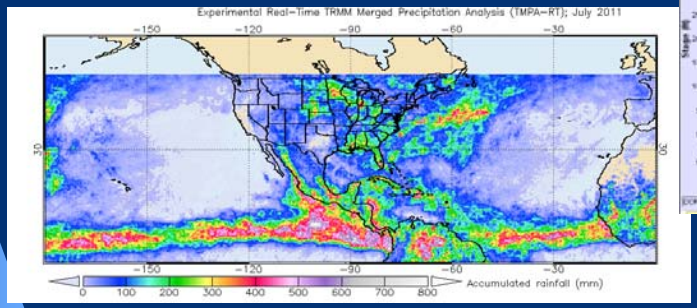


GPM in the NOAA Integrated Water Forecasting Program

CAPT Barry Choy
Acting Director
NWS Office of Hydrologic Development









Overview

- NOAA Integrated Water Forecasting Program
- Precipitation needs for operational water predictions
- Needs and opportunities for use of GPM-era satellite precipitation estimates
- Recommendations and challenges

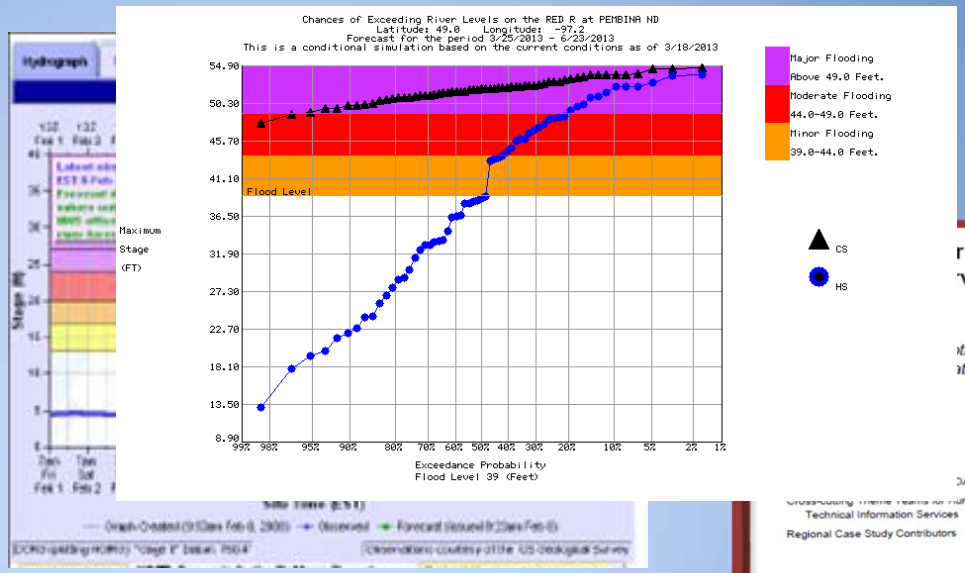


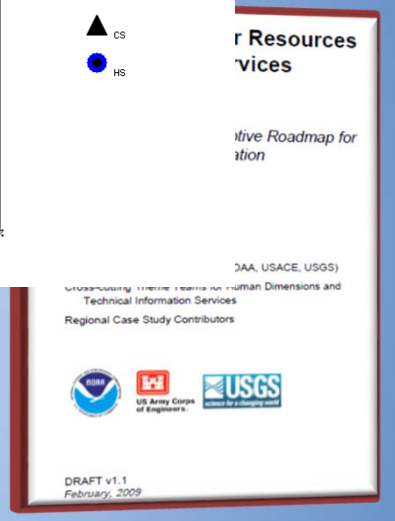
NOAA Integrated Water Forecasting Program

- Providing critical water-related forecasts and decision support services for the nation:
  - River stages
  - River and flash flooding
  - Water resources outlooks
  - Climatic extreme precipitation frequencies
- Evolving capabilities (summit to the sea):
  - Probabilistic streamflow prediction (longer range)
  - Soil moisture prediction

Service Delivery Programs

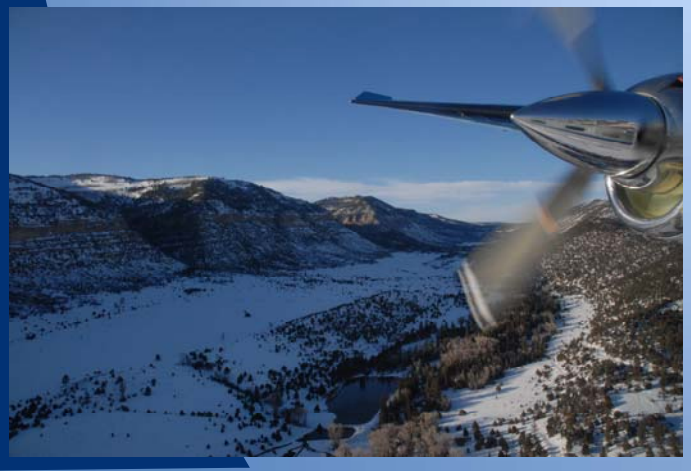






Advanced Hydrologic Prediction Service (AHPS)

Expanded forecast and water resources services



Integrated Water Resources Science and Services (IWRSS)

A framework to align multiple agencies with complementary water-related missions to accomplish operational goals; NOAA, USACE, USGS

Share technology, information, models, best practices

Precipitation Needs for Water Forecast Program

- Preipitation info (estimates and forecasts) is one of the most critical input forcings for a variety of water prediction needs

- Requirements for precipitation estimates:
  - Real-time: Accurate, high-resolution, low latency and seamless
  - Calibration: similar to real-time but without latency requirement and needs to be climatologically-consistent

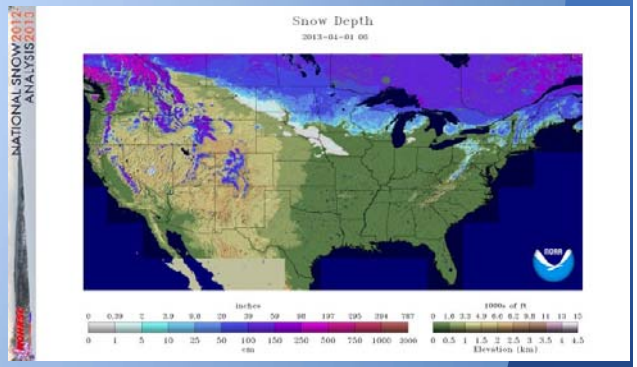


Current State of Operations

- Field offices create multisensor precipitation estimates from
  - Rain gauges
  - Ground radars (WSR-88Ds)
  - Airborne
  - GOES Infrared-based estimates (Hydro-estimator)



- Precipitation is input to:
  - Prediction models (Rainfall-runoff, Snowpack….)

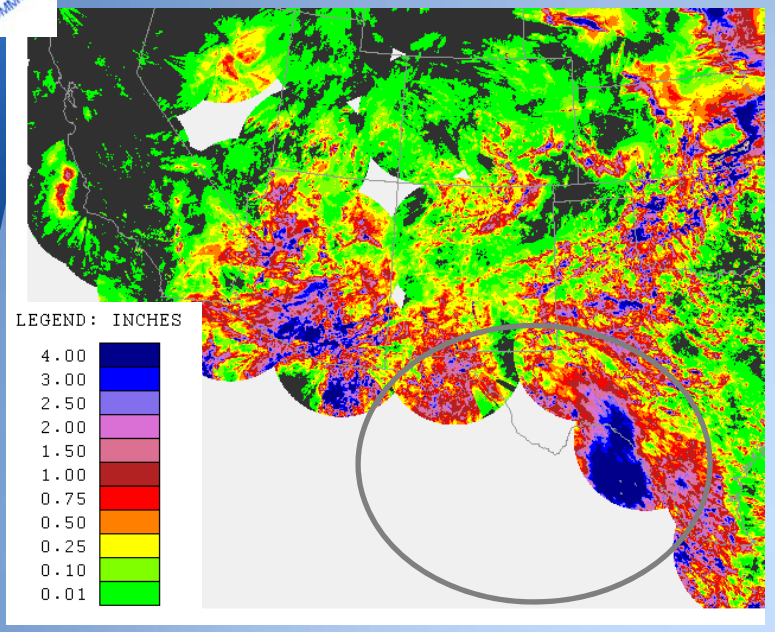


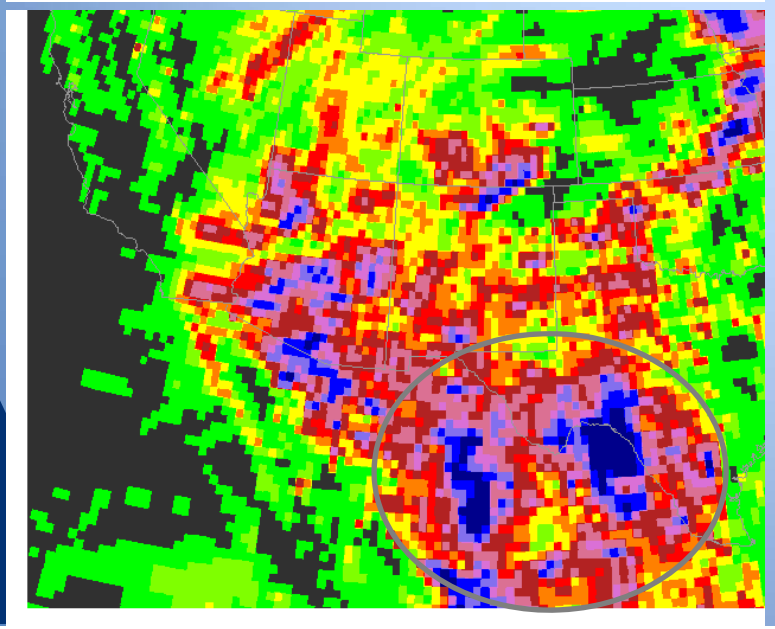
- Weather Forecast Offices:
  - Flash flood monitoring by radar and rain gauges
  - Issue watches and warnings to the public

Limitations of Existing Precipitation Products

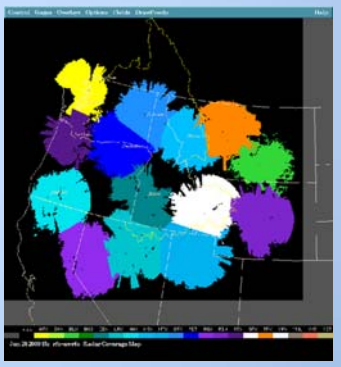
- Radar:
  - Beam blockage/overshooting
  - Radar-to-radar calibration differences
  - Dual-pol algorithms are evolving
- Gauges
  - Spatial coverage and
  - Quality control and maintenance issues
- GOES IR-based estimates
  - Low latency but often inaccurate
  - Parallax location errors at higher latitudes
- NWP models
  - Poor absolute accuracy

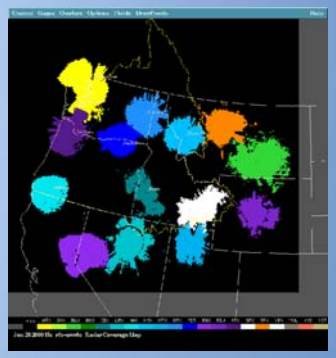
Radar Coverage Gaps:





RADAR
Total rainfall 27-31 Aug 2008
Southwestern US
No coverage (white) or compromised coverage over many areas.
Oval shows area contributing to the Rio Grande.
Precipitation values from WSR-88D network





SATELLITE
Total rainfall 27-31 Aug 2008
Southwestern US and Mexico
Spatially complete coverage over all areas contributing runoff to United States rivers.
Precipitation values from NWS CMORPH products

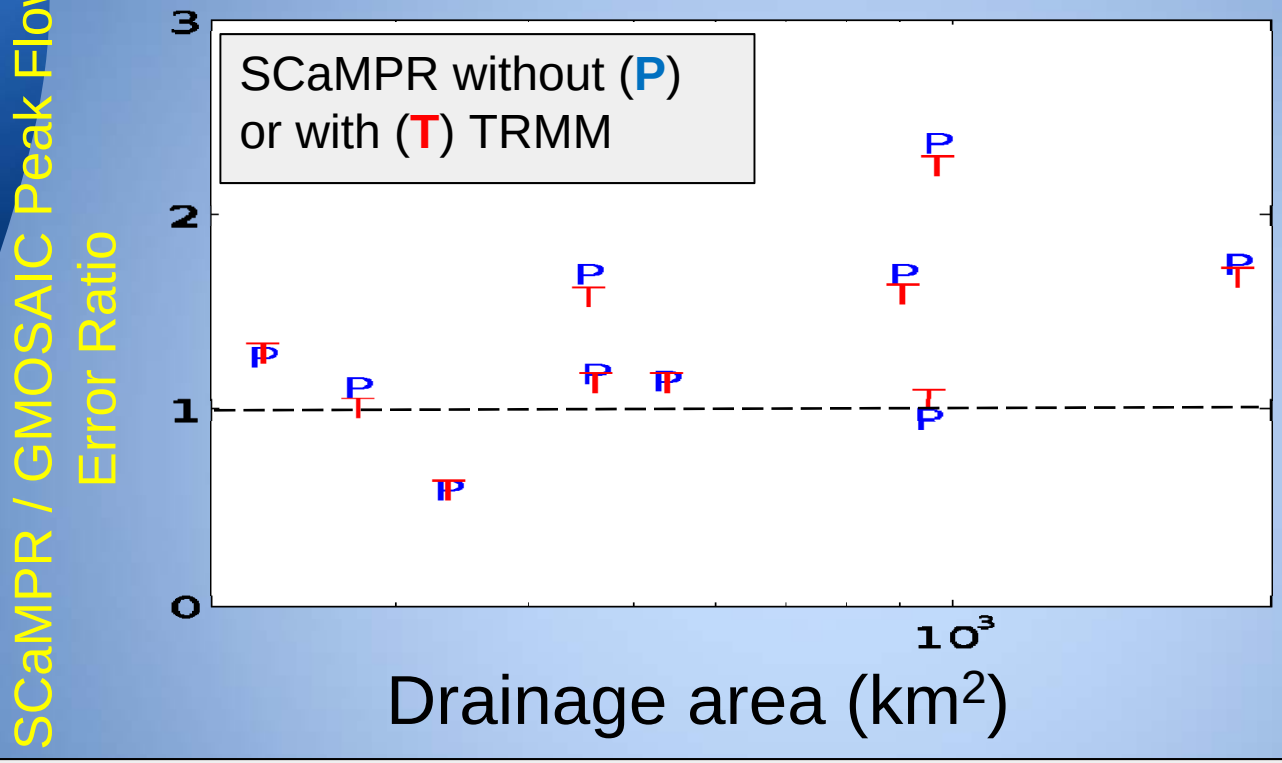
What does GPM offer?

- Direct
  - Fills in the gaps in radar/gauge coverage
  - Identify/mitigate conspicuous radar/gauge/IR quality issues
  - Snow detection in cold regions
- Indirect
  - Better forecasts from numeric weather/climate prediction models

Status of Current Work

- OHD and NESDIS have conducted studies to identify the effects of TRMM (proxy of GPM) on:
  - Hydrologic forecast accuracy
- OHD has worked with RFCs to come up with algorithm enhancements to better meet their requirements for satellite precipitation
- OHD has participated in developing the Level 1 Requirements Document and CONOPS document for NOAA Enterprise Precipitation System

The impacts of TRMM Ingest



Control experiments using Self-calibrating multivariate precipitation retrieval (SCaMPR) products w/ and w/o TRMM

TRMM ingest yields broadly lowered errors in streamflow simulation

Challenges and Next Steps

- Better O2R paradigm
  - Does GPM algorithm development address forecast needs?
  - How does GPM complement the strength of our existing sensor platforms?
- Recommendations
  - Use a test bed environment
    - Demonstrate/identify the utility of GPM-era QPE for a variety of water resources prediction needs
    - Increased synergy between NOAA and NASA in developing fusion products that meet the operaional requirements

Opportunities

- Development of NOAA Enterprise Precipitation Processing System for multi-sensor data integration
- Development of NCEP Rapid Updating Analysis system
- Operations at River Forecast Centers and National Water Center to add value to precipitation products





Barry.Choy@noaa.gov

