

Vision for New NOAA Products in the GPM Era

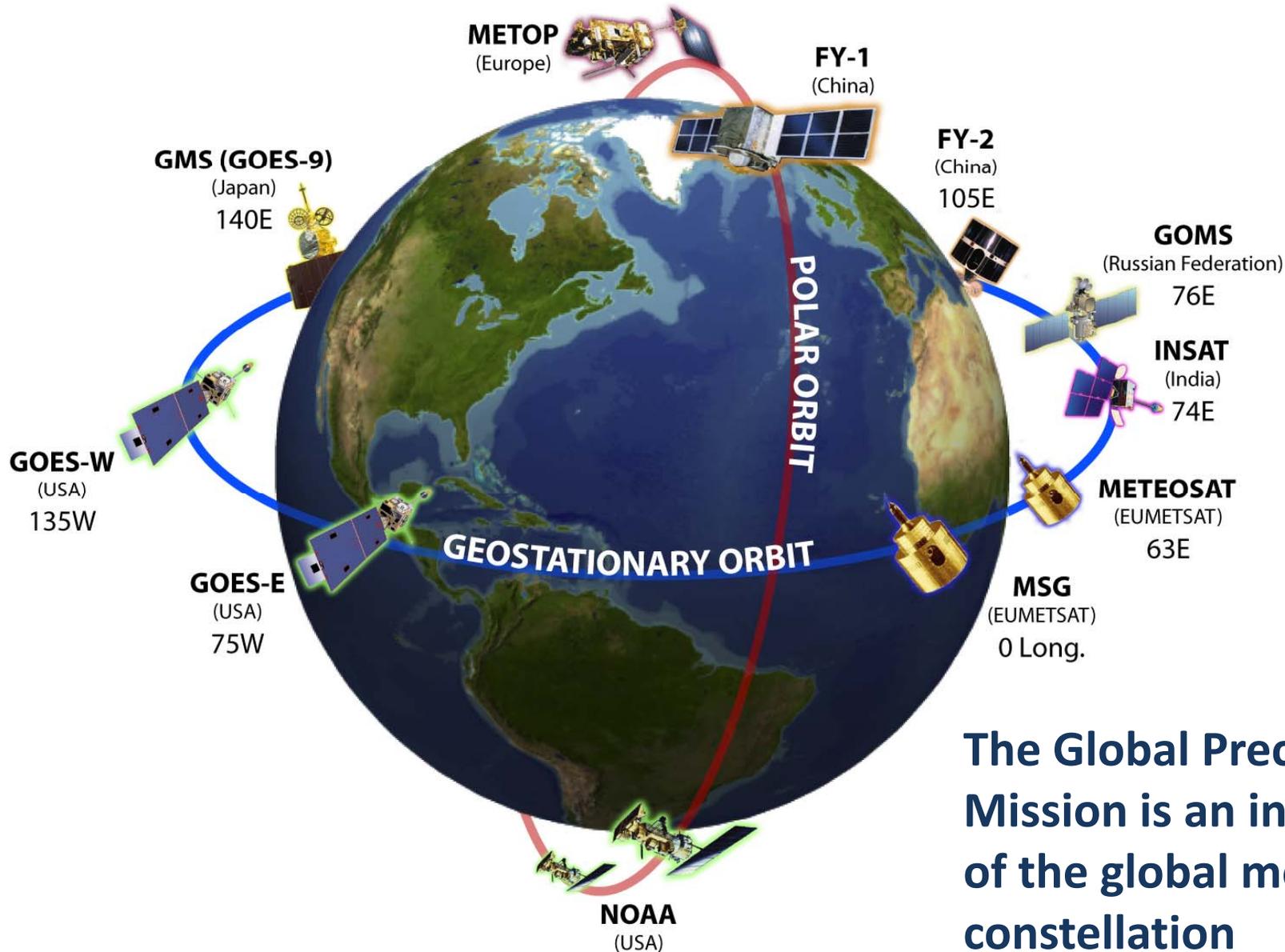
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Global Earth Observing System



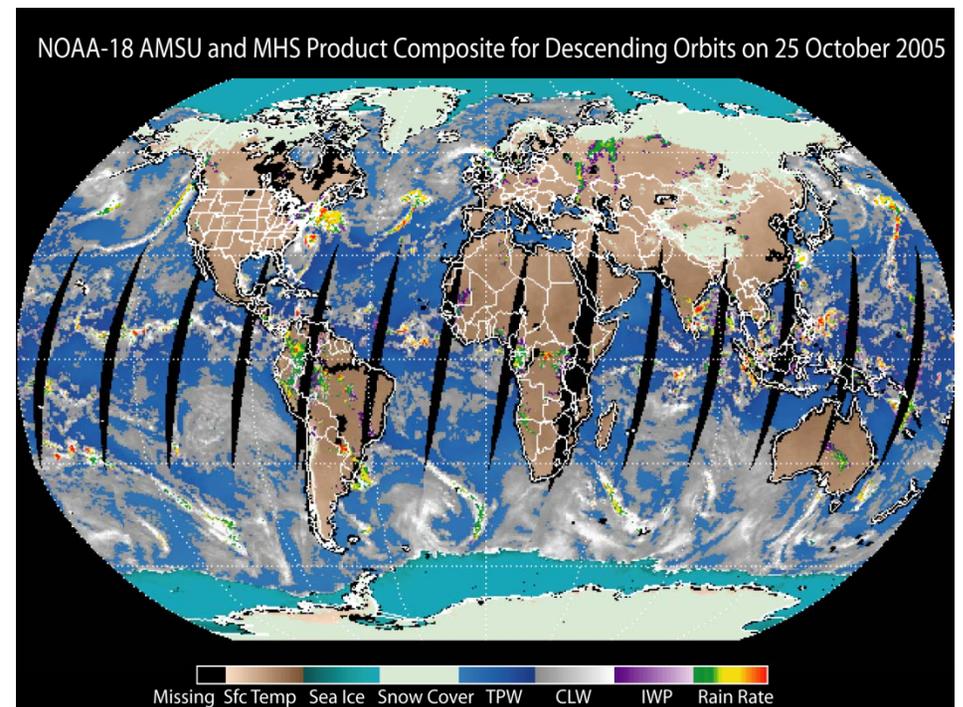
The Global Precipitation Mission is an integral part of the global monitoring constellation

Microwave & Radiometric Hydrological Products

Using **Global Intercalibrated, Multiple Satellite Measurements**

Combined with In-Situ Measurements

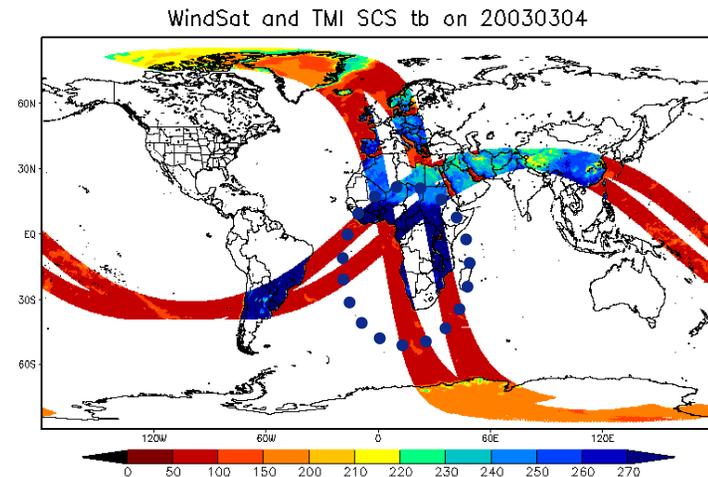
- Operational suite of products from :
 - Precipitation rate
 - Soil Moisture
 - Snow cover and water equivalent
 - Sea-ice concentration
 - Land surface temperature
 - Land surface emissivity
 - Total precipitable water
 - Cloud liquid water
 - Ice water path
- Climate related products:
 - 5-day
 - Monthly



Microwave Instrument Cross-calibration

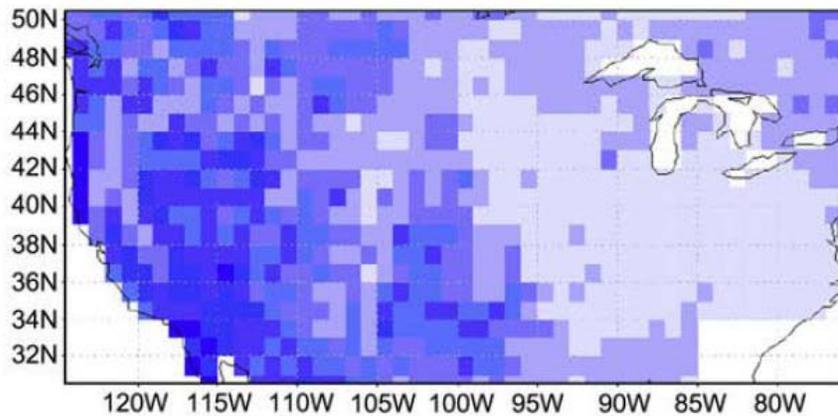
- ❖ *Developed the simultaneous conical-scanning overpass (SCO) method to calibration TMI/Windsat*
- ❖ *SCO is planned for NASA SMAP/ESA's SMOS observations.*

TMI/Windsat Intercept Area

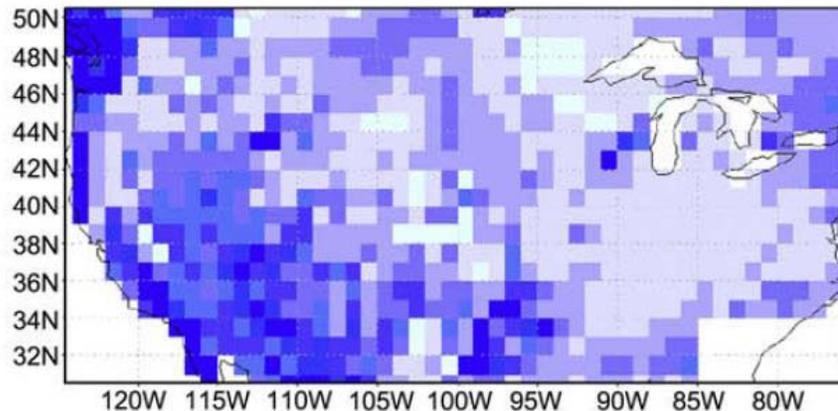


Cross-calibration will ensure the highest quality data and consistency with other satellite sensors.

Soil Moisture Data Used in Data Assimilation



0 0.02 0.04 0.06 0.08 0.1 0.12
(RMSE_Noah – RMSE_EnKF) for Surface



0 0.02 0.04 0.06 0.08 0.1 0.12
(RMSE_Noah – RMSE_EnKF) for Root Zone

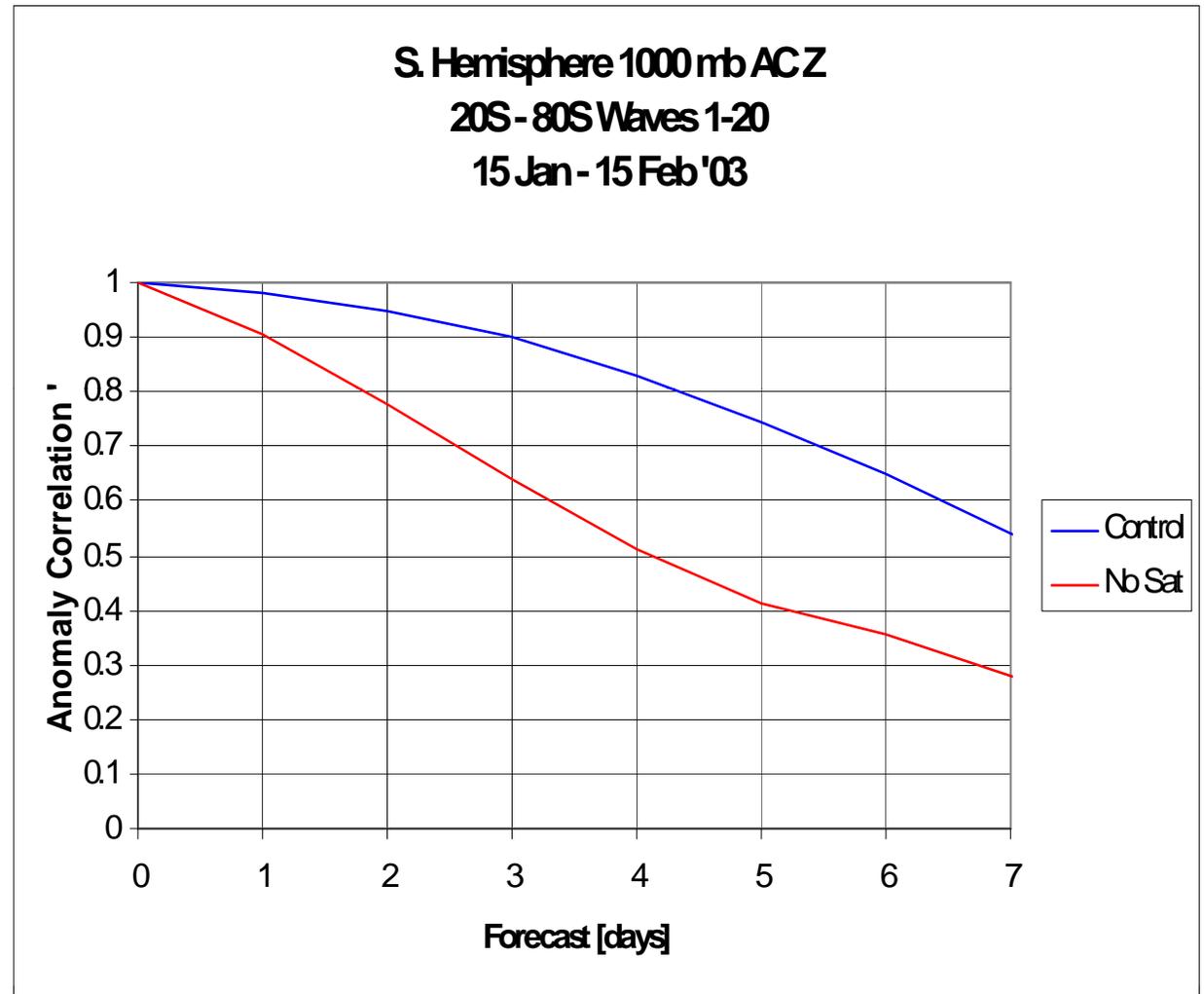
Assimilating AMSR-E soil moisture data using the Ensemble Kalman Filter (EnKF) reduces the root-mean-square-errors (RMSEs) of the Noah land surface model simulations of the surface layer and root-zone soil moisture.

Assimilating more reliable soil moisture data is expected to improve numerical weather prediction models.

Kumar et al. (2008), Adv. Water Resour., 31 (2008) 1419–1432.

Forecast Skill With and Without Satellite

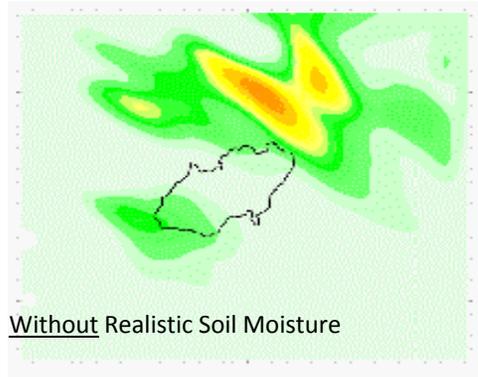
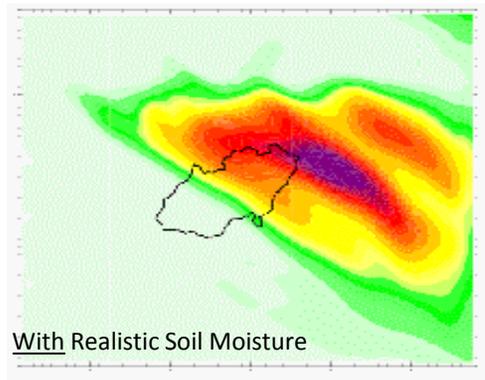
- **Joint Center for Satellite Data Assimilation Mission:** Accelerate and improve the quantitative use of research and operational satellite data in weather and climate prediction models
- **Vision:** A weather and climate prediction community empowered to effectively assimilate increasing amounts of advanced satellite observations



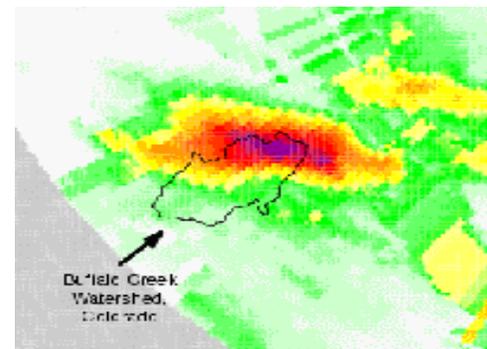
Satellite data is critical for improving forecast skill

More Realistic Soil Moisture Data Lead to Better Rainfall Forecast

24 Hour forecast of rainfall over Buffalo Creek Basin, Colorado



24 Hour Observed Rainfall over Buffalo Creek Basin, Colorado

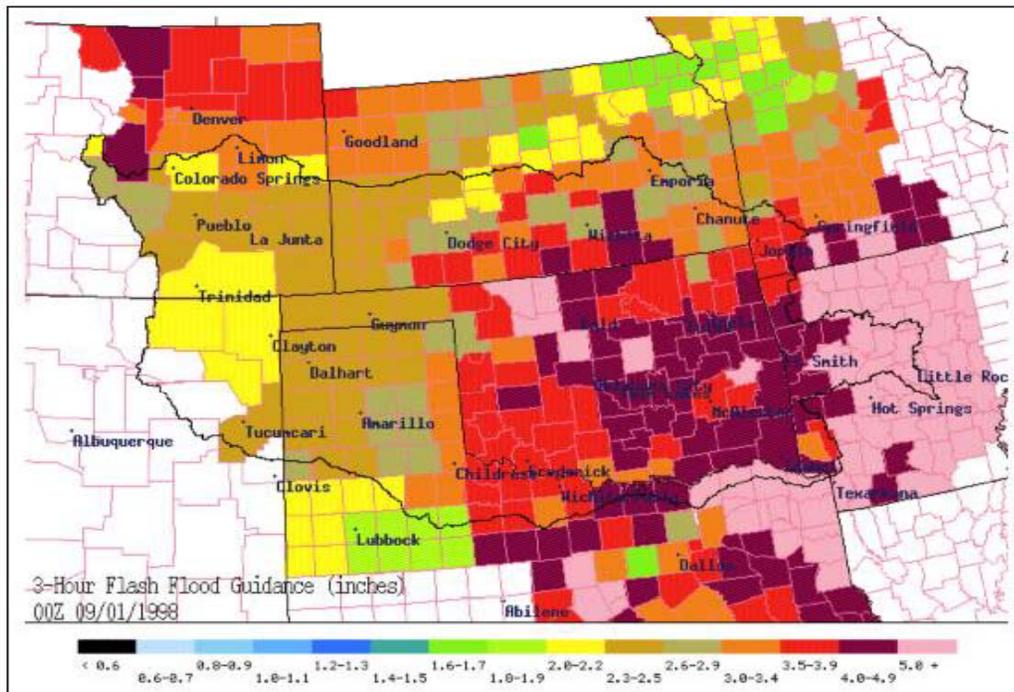


Buffalo
Creek
Basin

Observed Rainfall
0000Z to 0400Z
13/7/96
(Chen et al.,
NCAR)

Using realistic soil moisture in numerical weather prediction model improves the rainfall forecast significantly

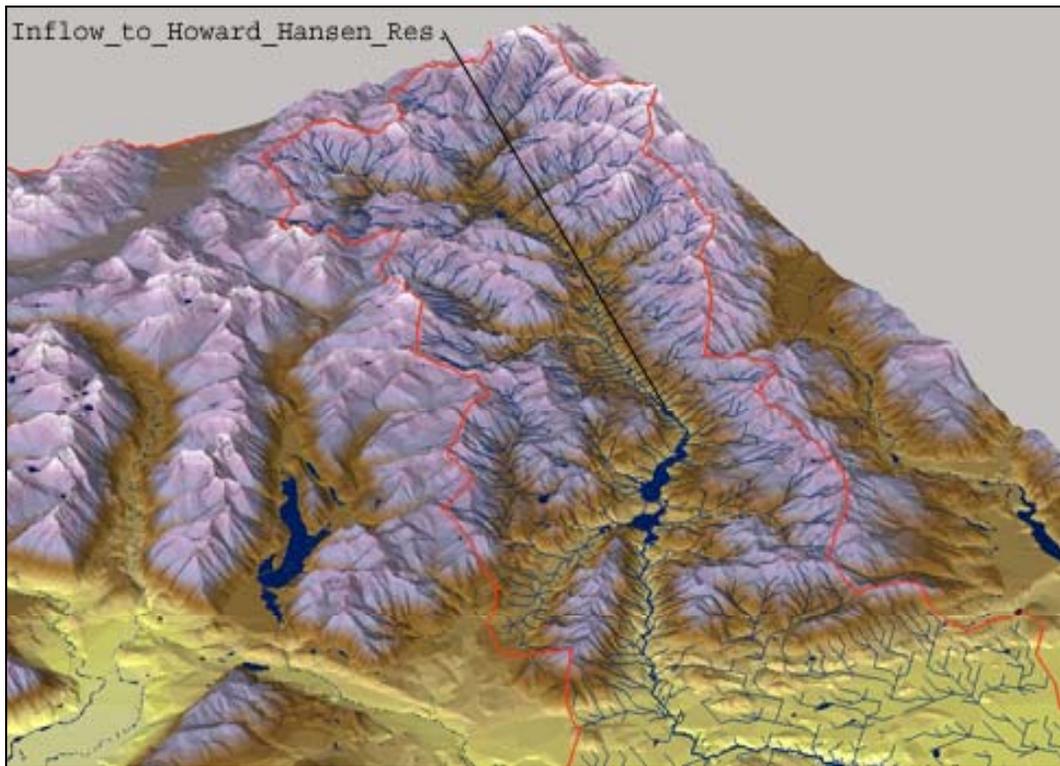
Soil Moisture Data Used for NOAA's Flash Flood Forecasting



Current NWS operational 30 km Flash Flood Guidance (FFG) is also based on modeled surface soil moisture data.

Reliable soil moisture data from satellites and in-situ monitors will enhance the Flash Flood Guidance of NOAA-NWS.

Soil Moisture Data Needed for Initializing NOAA's River Forecast Models



River Forecast Models used at NOAA River Forecast Centers also need surface soil moisture data for model initialization.

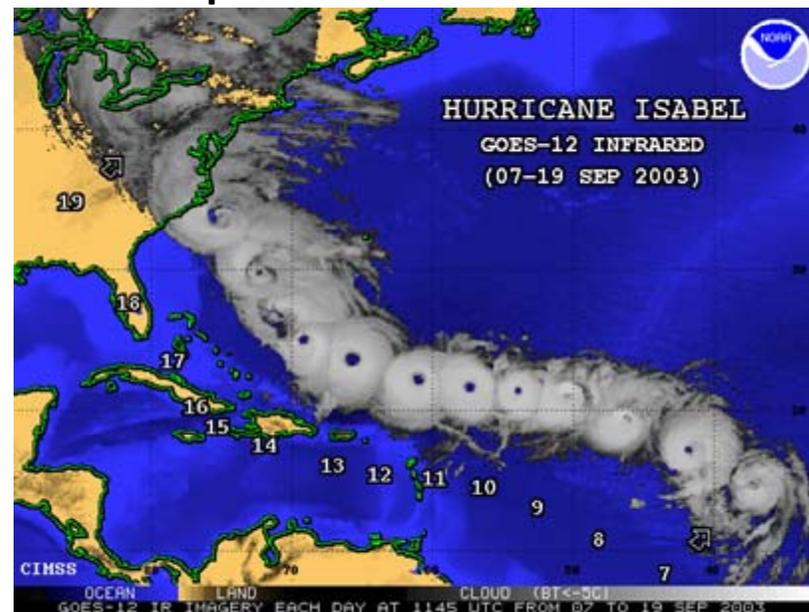
Satellite and in-situ measurements will provide more reliable real time moisture data and improve the accuracy of these river forecast models of NOAA.

Floods Account For \$5.2 Billion In Damages, And Average Over 80 Deaths Per Year

Hurricanes Cause an Average of \$5.1 Billion In Damages, And 20 Deaths Per Year



Hurricane Isabel Left 27 Dead In 7 States And 3.3 Million People Without Electrical Power



NOAA is where science earns value

