



# ***Operational NOAA/NESDIS Satellite Analysis Branch (SAB) Requirements/Desires for the GPM Era***

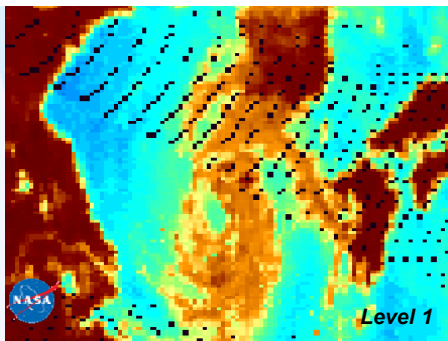
**Sheldon J. Kusselson**

**NOAA/NESDIS/OSDPD/SSD/Satellite Analysis Branch (SAB)**

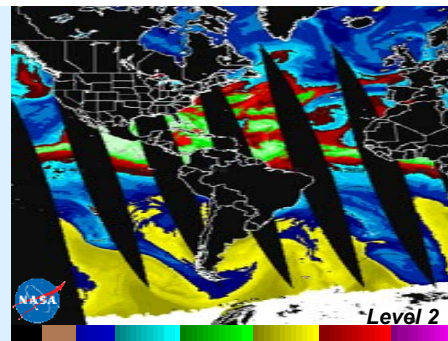
**Sheldon.Kusselson@noaa.gov**

***Collaborators:*** Limin Zhao, NOAA/NESDIS/OSDPD/SSD, Precipitation Product Area Lead  
Matthew Seybold, NOAA/NESDIS/OSDPD/SSD, Tropical Product Area Lead  
Ralph Ferraro and Bob Kuligowski, NOAA/NESDIS/STAR  
Mike Turk, NOAA/NESDIS/OSDPD/SSD, **SAB Tropical Team Lead**  
John Simko, NOAA/NESDIS/OSDPD/SSD, **SAB Precipitation Team Lead**

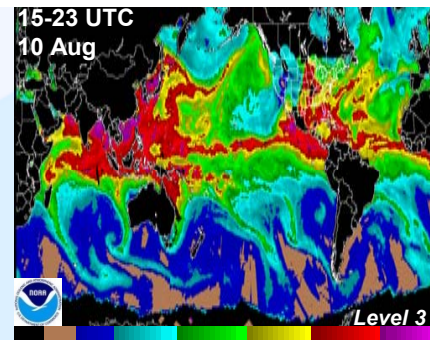
TRMM TMI 37GHz 0836 UTC 10 Aug



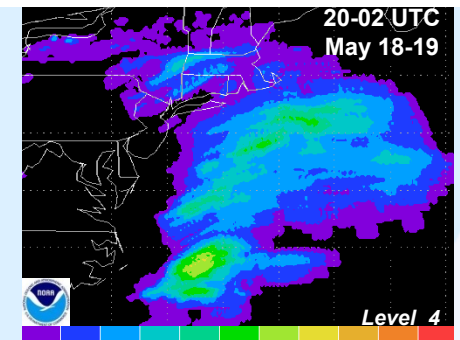
AMSR-E TPW 12-23 UTC 10 Aug



Blended Total Precipitable Water



QMORPH 6h Rainfall Accumulations



***1st NOAA Global Precipitation Mission (GPM) User's Workshop***

***August 18-19, 2010***

***College Park, Maryland***

# NOAA/NESDIS/OSDPD/Satellite Services Division (SSD)/ Satellite Analysis Branch (SAB) Program Desires/Requirements

## Parameter

| Observation Requirement                            | T/O | Geographic Coverage | Vertical Resolution |       | Horizontal Resolution |    | Measurement Accuracy |       | Measurement Precision |       | Sampling Interval |    | Data Latency |    |
|----------------------------------------------------|-----|---------------------|---------------------|-------|-----------------------|----|----------------------|-------|-----------------------|-------|-------------------|----|--------------|----|
| Precip. Rate<br>Type: Rain/Snow                    | T   | Global              | -----               | ----- | 5                     | km | 2.0                  | mm/h  | 1.0                   | mm/h  | 3                 | hr | 2            | hr |
|                                                    | O   | Global              | -----               | ----- | < 3                   | km | 1.0                  | mm/h  | 0.5                   | mm/h  | < 1               | hr | <0.5         | hr |
| Total Precip Water (TPW)                           | T   | Global              | -----               | ----- | 22                    | km | 1.0                  | mm    | 1.0                   | mm    | 3                 | hr | 2            | hr |
|                                                    | O   | Global              | -----               | ----- | < 11                  | km | 1.0                  | mm    | 1.0                   | mm    | < 1               | hr | <0.5         | hr |
| MW channel<br>brit values<br>85-91GHz/<br>36-37GHz | T   | Global              | -----               | ----- | 4 X 6<br>8 X14        | km | -----                | Deg K | -----                 | Deg K | 3                 | hr | 2            | hr |
|                                                    | O   | Global              | -----               | ----- | 1 X 2<br>2 X 4        | km | -----                | Deg K | -----                 | Deg K | < 1               | hr | <0.5         | hr |
| MW<br>reflectivities<br>(precip radar)             | T   | W Hemis             | 250                 | m     | 4                     | km | 2.0                  | mm/hr | 1.0                   | mm/h  | 3                 | hr | 2            | hr |
|                                                    | O   | Global              | 100                 | m     | < 2                   | km | 1.0                  | mm/hr | 0.5                   | mm/h  | <0.5              | hr | <0.5         | hr |

### Comments/Other Desires:

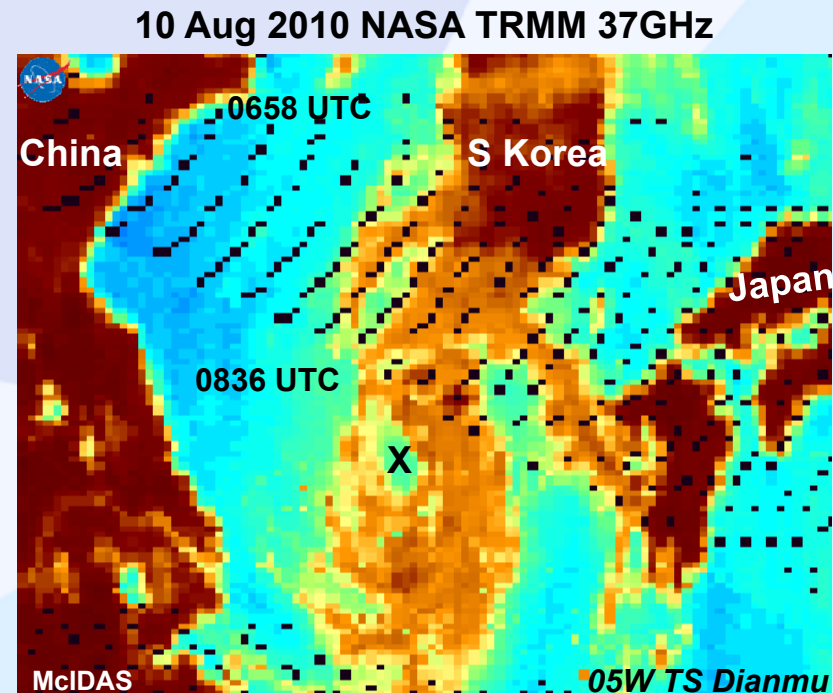
- Range of Rain Rates – minimum (T) 0 to 55 mm/hr; objective (O) 0 to 75 mm/hr
- Range of Total Precipitable Water – minimum (T) 1.0 to 75 mm; objective (O) 1.0 to 85 mm
- Swath width – min (T) 250 km Precip Radar (PR) / 1700 km MW; objective (O) 700km PR / 2200km MW
- Rain mask for TPW – min (T) only for moderate to heavy rain; objective (O) only for heavy rain

# NOAA/NESDIS SAB Operational Worldwide Tropical Analysis Support

*Providing 24 x 7 x 365 worldwide classification of tropical disturbances*

*Supporting NOAA NHC, DOD JTWC and RSMCs with position & intensity*

- Current Analysis
  - Geostationary IR/VIS/6.7 $\mu$  Water Vapor
  - P-O microwave 85-91GHz / 36-37GHz
- GPM Desires
  - Sampling  
min = 3h; obj = < 1h
  - Latency  
min = 2h; obj = < 30m
  - Horizontal Resolution (km)  
min = 4x6 / 8x14; obj = 1x2 / 2x4



## Future/ GPM era Product

Advanced **D**vorak **T**echnique (ADT) development

- **Combine GEO/LEO, numerical model data for more accurate position/intensity estimate**



# NOAA/NESDIS/SAB Precipitation Program



*24 x 7 x 365 monitoring of heavy precipitation emphasizing satellite analysis, short term trends and rainfall estimates*

## Supporting NWS WFO/RFCs

### Priorities

- heavy rainfall / flash flooding
- moderate to heavy winter precipitation
  - West Coast winter storms
  - Great Lake snows



Satellite (SPENES)  
discussion  
messages

IM chat  
messages

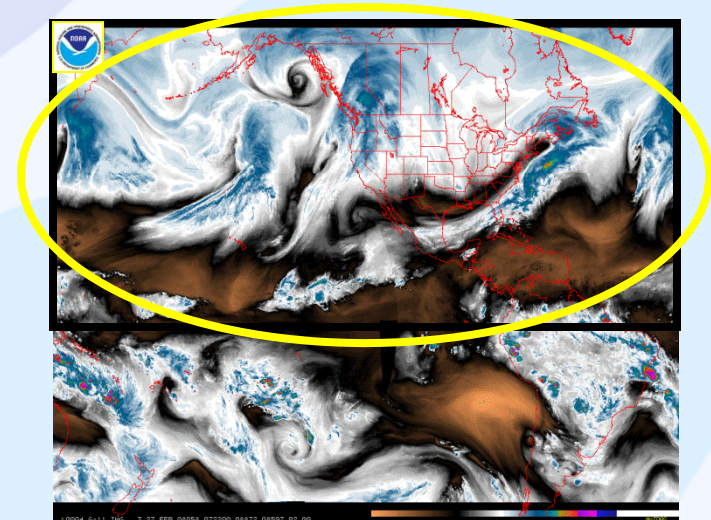
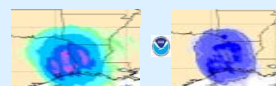
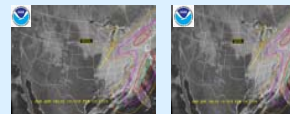
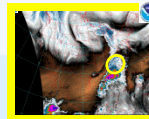
graphical  
analysis

satellite  
rainfall  
estimates

## Supporting NWS NCEP HPC

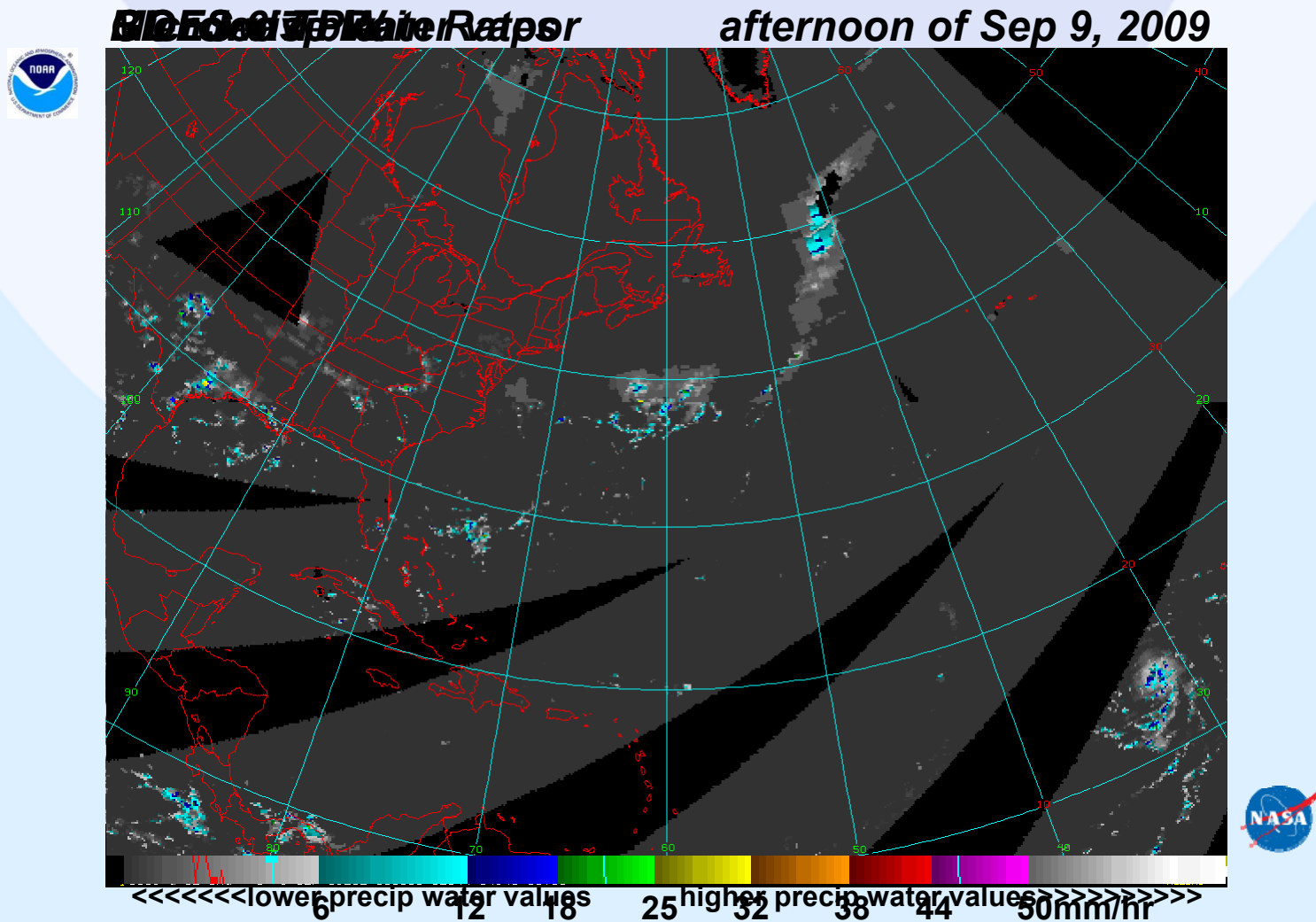
### Priorities

- excessive rainfall area
- 0-6 hr rainfall guidance
- precipitation trends
- satellite tropical rainfall
- satellite rainfall estimates



<http://www.ssd.noaa.gov/PS/PCPN/>

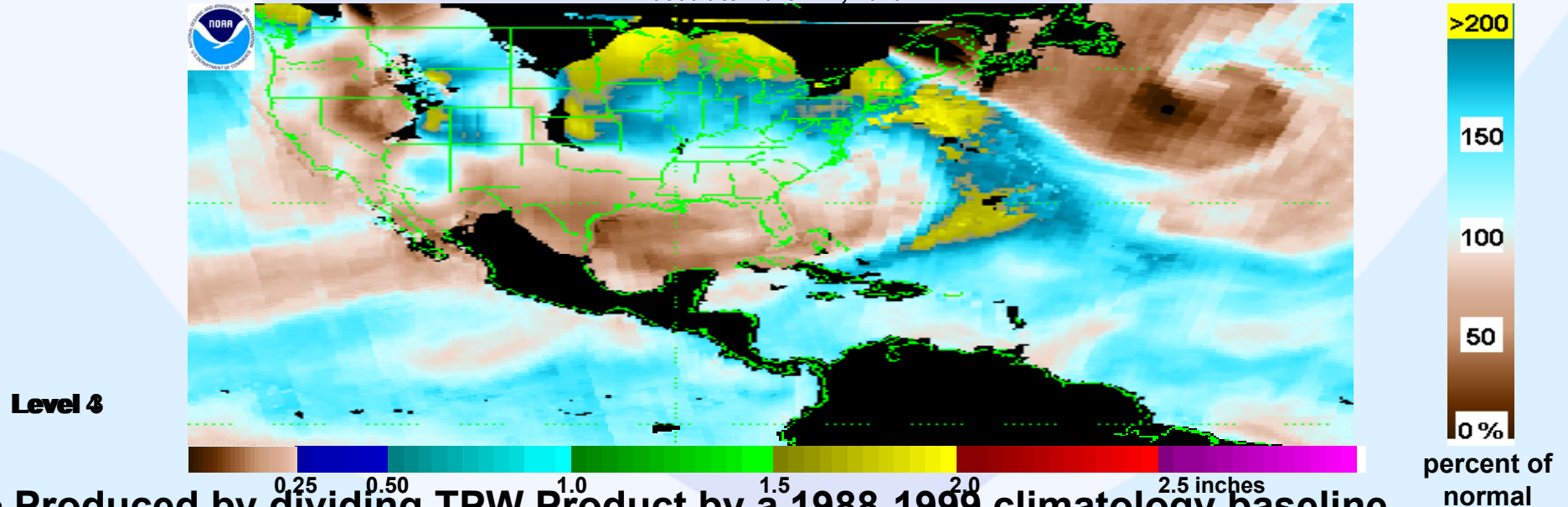
# Analysing different types of satellite data and products



providing information to forecasters to help in the heavy precipitation/flash flood decision process

# Operational Base Blended Total Precipitable Water (TPW) Product

0800 utc March 14, 2010



- Produced by dividing TPW Product by a 1988-1999 climatology baseline over water - blends TPW from low earth orbiting microwave satellites through NASA Water Vapor Project
- overland - uses GPS data overland and GOES sounder fills in gaps  
 • **Brown areas below normal; Aqua above normal; Yellow above 200%** - Kidder and Jones, 2007
- Can approximate 150% with 2 standard deviations above normal

## Requirements in the GPM Era

| Observation Requirement          | T/O | Geographic Coverage | Vertical Resolution |      | Horizontal Resolution |    | Measurement Accuracy |    | Measurement Precision |    | Sampling Interval |    | Data Latency |    |
|----------------------------------|-----|---------------------|---------------------|------|-----------------------|----|----------------------|----|-----------------------|----|-------------------|----|--------------|----|
| Total Precip Water (TPW) Level 2 | T   | Global              | ----                | ---- | 22                    | km | 1.0                  | mm | 1.0                   | mm | 3                 | hr | 2            | hr |
|                                  | O   | Global              | ----                | ---- | < 11                  | km | 1.0                  | mm | 1.0                   | mm | < 1               | hr | < 0.5        | hr |

# Experimental Blended Rain Rates

## CIRA-NESDIS Exp Blended Rain Rate Product



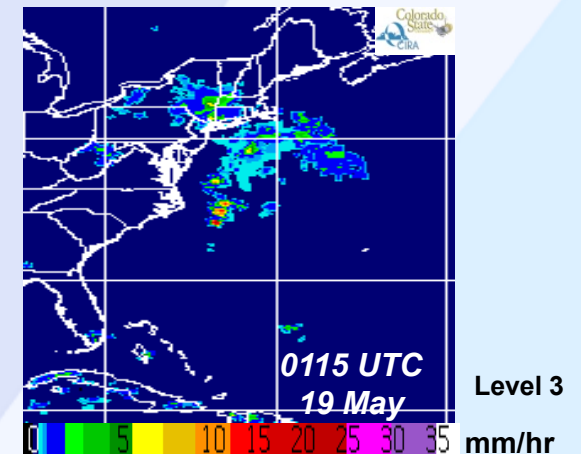
blends microwave rain rates from many different low-earth orbiting satellites

| Observation Requirement | T/O | Geographic Coverage | Vertical Resolution |      | Horizontal Resolution |    | Measurement Accuracy |      | Measurement Precision |      | Sampling Interval |    | Data Latency |    |
|-------------------------|-----|---------------------|---------------------|------|-----------------------|----|----------------------|------|-----------------------|------|-------------------|----|--------------|----|
| Precip. Rate            | T   | Global              | ----                | ---- | 5                     | km | 2.0                  | mm/h | 1.0                   | mm/h | 3                 | hr | 2            | hr |
| Type: Rain/Snow         | O   | Global              | ----                | ---- | < 3                   | km | 1.0                  | mm/h | 0.5                   | mm/h | < 1               | hr | < 0.5        | hr |



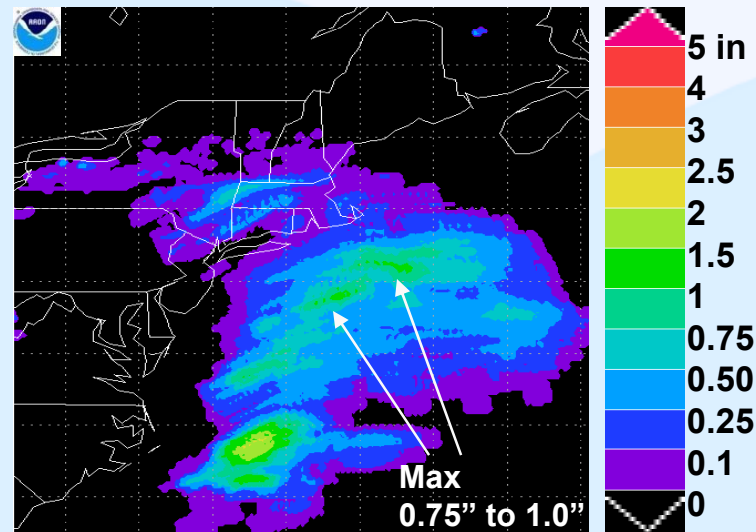
Future/GPM Era: Include **GEO** and other *research type microwave satellites*

<http://cat.cira.colostate.edu>



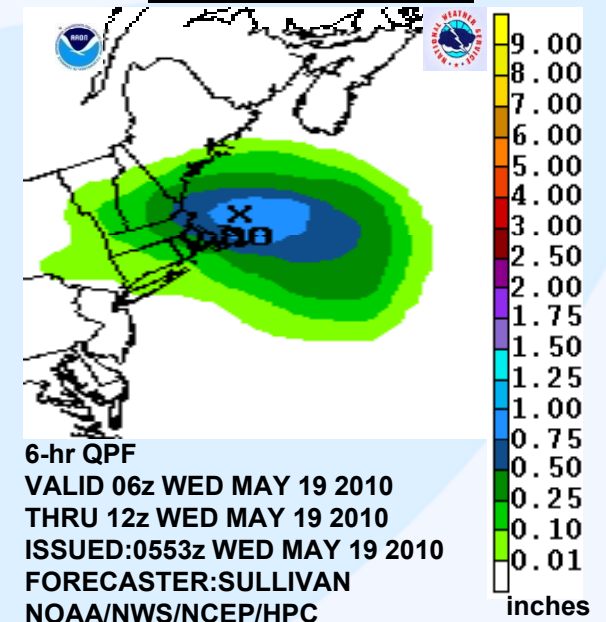
## Experimental QMORPH Rain Rate Accumulations

Level 4



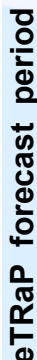
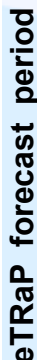
6h estimated rain accumulations  
ending 02 UTC 19 May

## NESDIS Support to NOAA/NWS



## eTRaP forecast period

eTRaP forecast period



eTRaP forecast period

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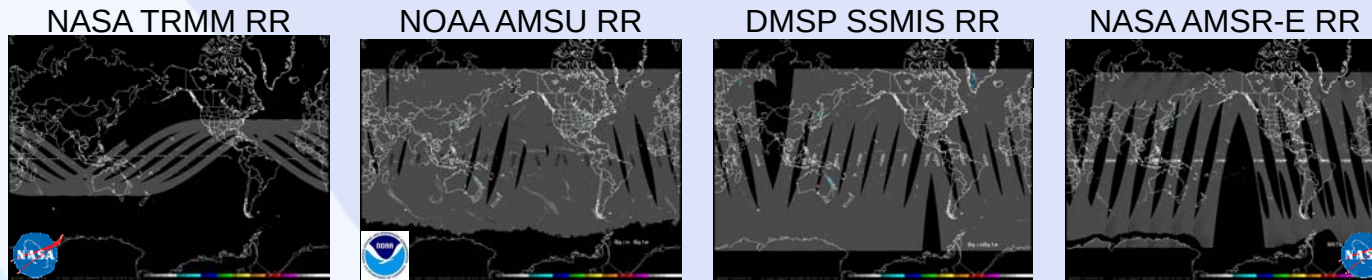
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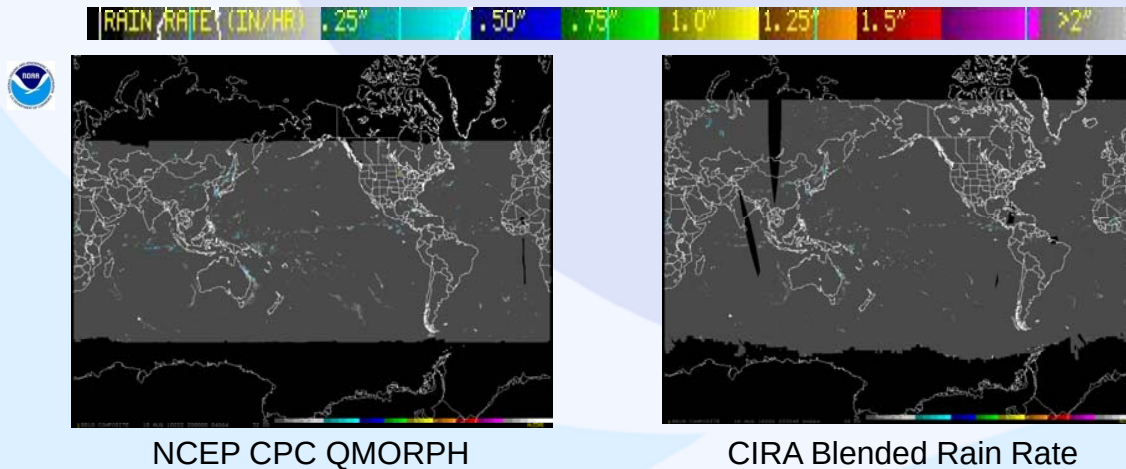
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# Current MW Rain Rate Products Used by NOAA/NESDIS SAB



**current global  
composited  
single satellite  
sensor MW rain  
rate products**



**current global  
blended  
multi-satellite  
rain rate  
products**

# Current Mostly MW TPW Products Used by NOAA/NESDIS SAB

