

AMSR and other Aqua Data in Global Precipitation Analysis: Progress and Plans

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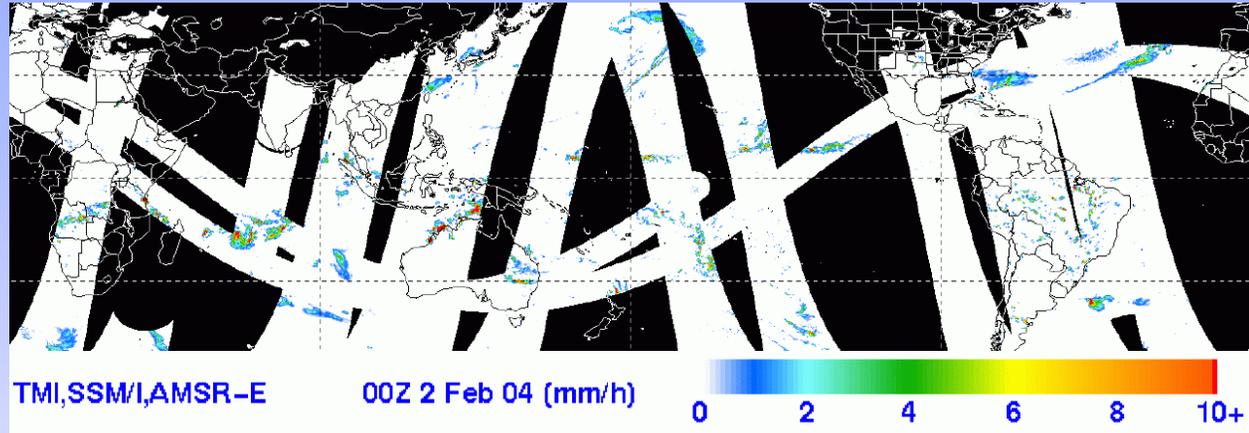
G. Huffman, D. Bolvin, E. Nelkin

TRMM Multi-satellite Precipitation Analysis (TMPA)

Current Microwave Constellation

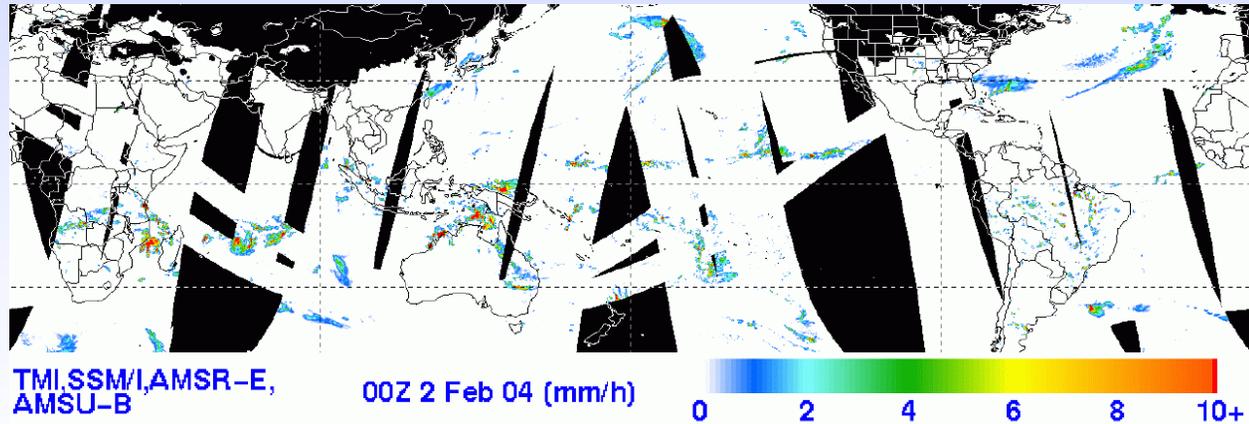
Combined “high quality”
(conical scanning)
microwave data coverage:
Averages 55% with TRMM,
AMSRE and 3 SSM/I's--
using GPROF algorithm

(3-hour window)



Addition of 3 AMSU-B's--
using NESDIS algorithm:
Total coverage averages ~
85% (lower quality over
ocean)

*Remaining gaps filled by Geo-
IR precipitation estimates*



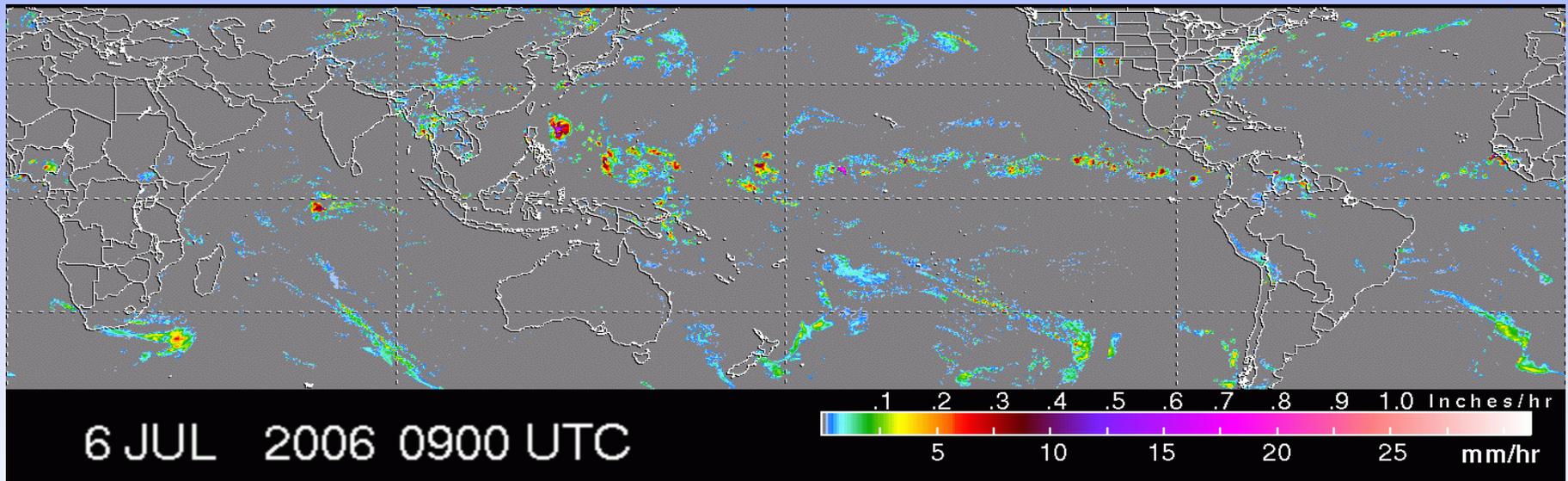
Version 6 3B42 for research: Eight year, 3-hr data set, 1998-near present (includes gauge info.); similar real-time analysis available with ~6hr delay

TRMM-Based Multi-Satellite Precipitation Analysis (TMPA)

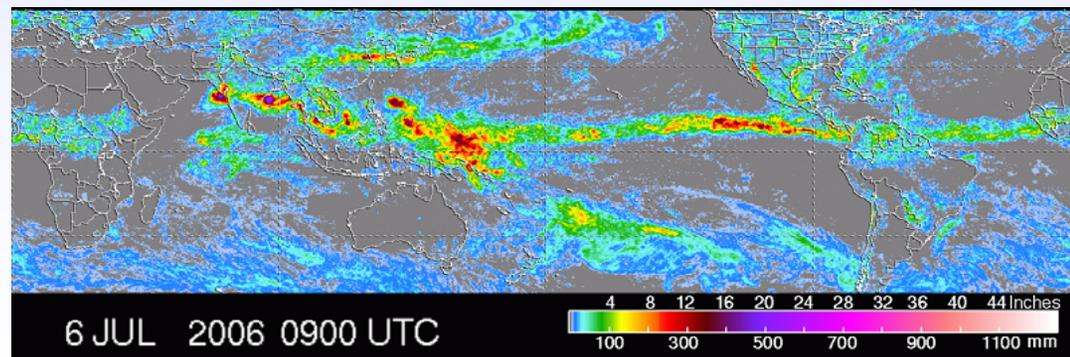
TRMM Calibrating Other Satellites

- Uses TRMM PR/TMI product to calibrate polar-orbit and geo rain estimates
- Rain estimates combined in 3-hr windows via hierarchy (TRMM/AMSR/SSM/I, AMSU, Geo-IR);

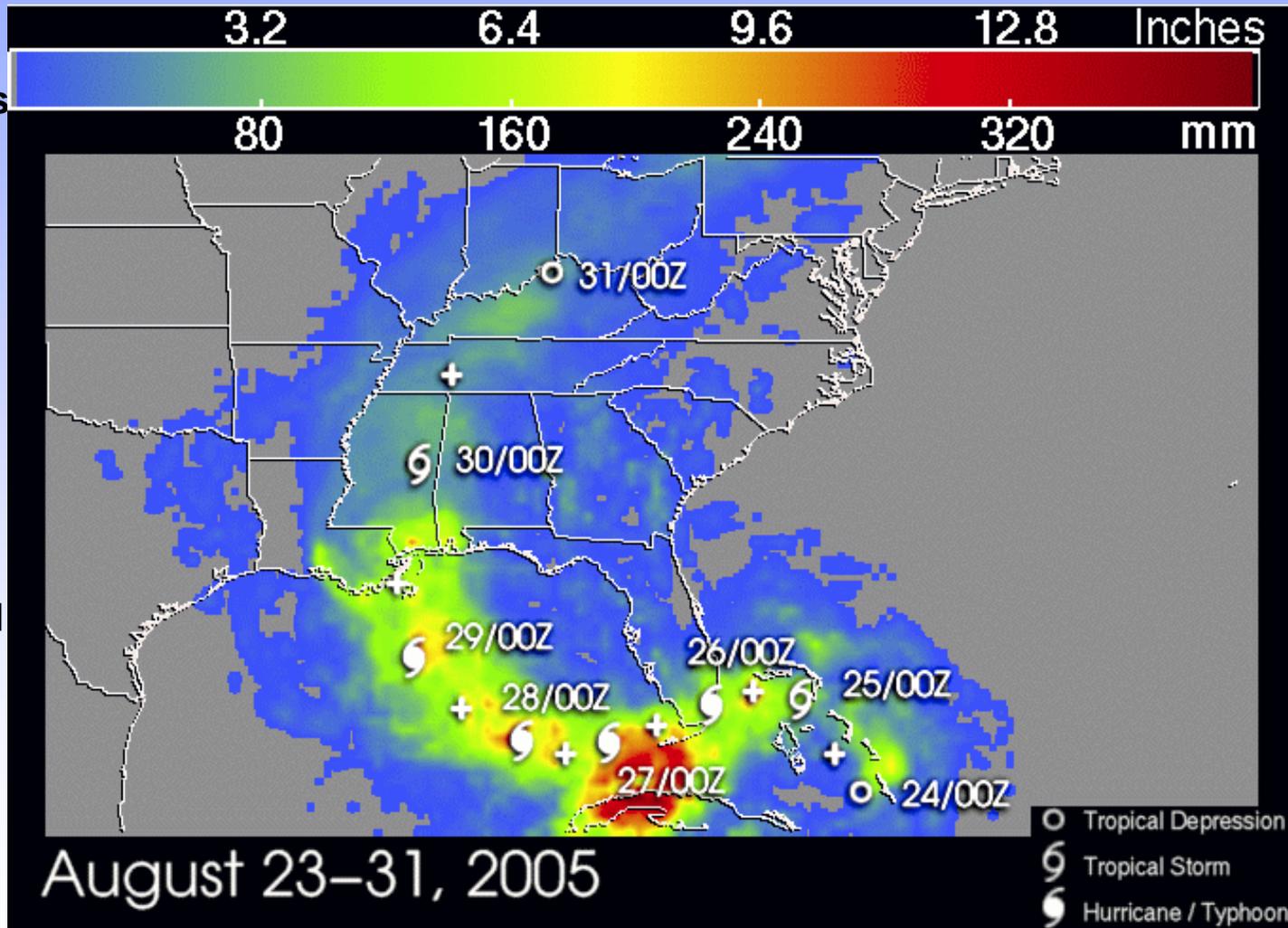
Version 6 3B42 (TMPA), 3-hr analysis (1 Jan. 1998-present)



<http://trmm.gsfc.nasa.gov>



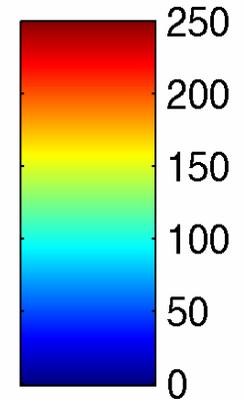
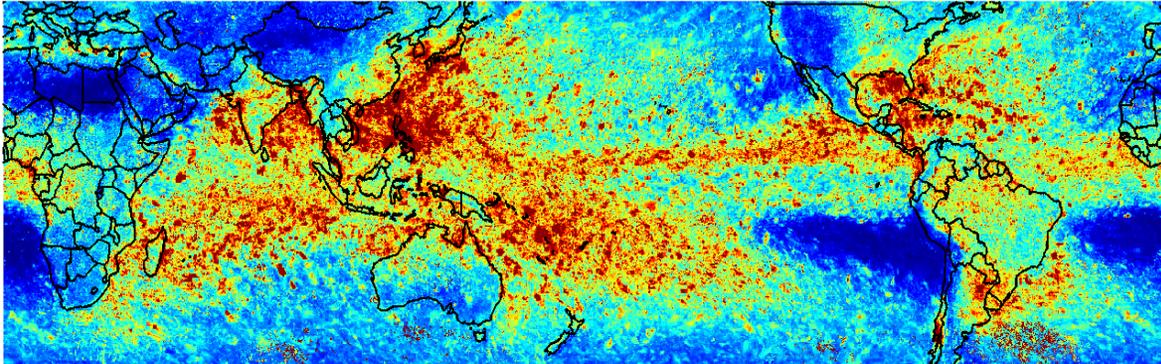
TRMM Multi-Satellite Precipitation Analysis (TMPA) of Hurricane Katrina's Rain Accumulation



- ◆ Rain history of Katrina from genesis over Bahamas to her extratropical transition over the Ohio Valley
- ◆ Heaviest rains fell as the storm was Cat 1 during and after landfall over south Florida
- ◆ Rain swath widened dramatically as the storm intensified to Cat 5
- ◆ Rapid forward speed limited inland rain accumulations
- ◆ Rain swath traces a broad arc around the western flank of the Atlantic subtropical ridge

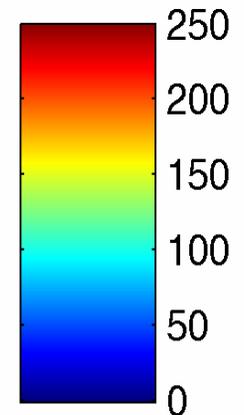
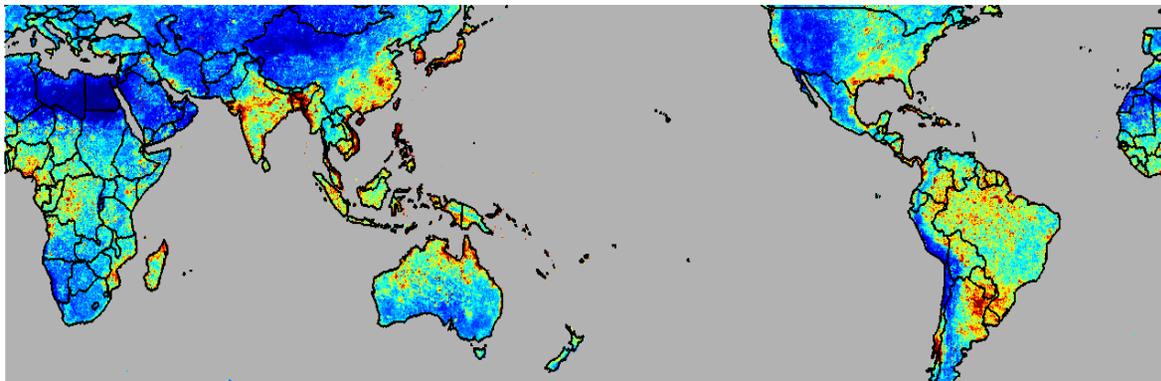
Use TMPA for Analysis of Extreme Precipitation Events

Largest Daily Rainfall out of 8-year 3B42 Daily Rainfall (mm/day)



Largest Daily Rainfall Over 8-year Period

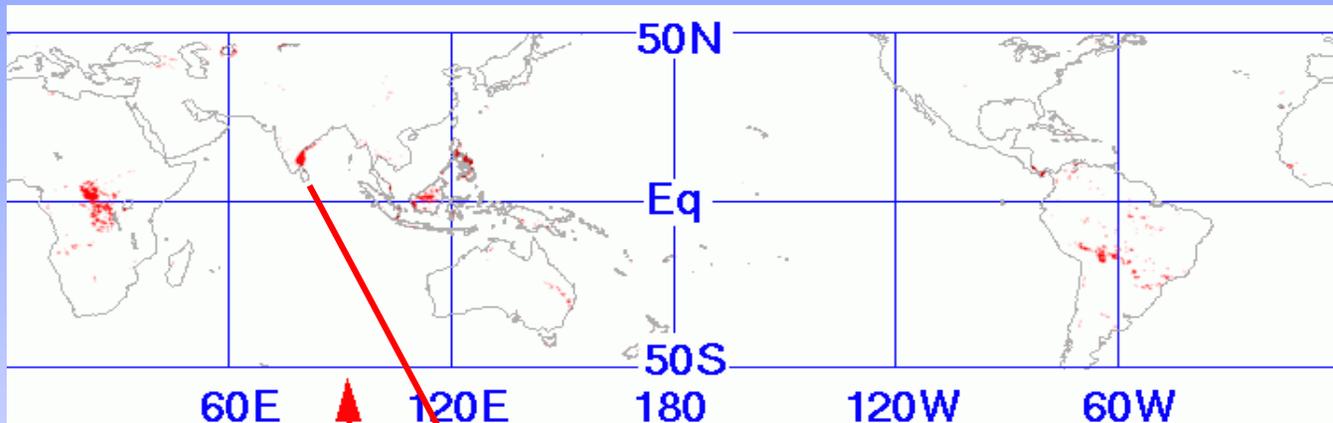
Largest Land Daily Rainfall out of 8-year 3B42 Daily Rainfall (mm/day)



From Satellite Rainfall to Flood Potential Maps

<http://trmm.gsfc.nasa.gov>

*Simple rain amount
thresholds: 24 hrs
ending 28 Oct. 2005
0000GMT
Threshold: 35 mm*



NEWS STORY:

More than 100 die in India floods

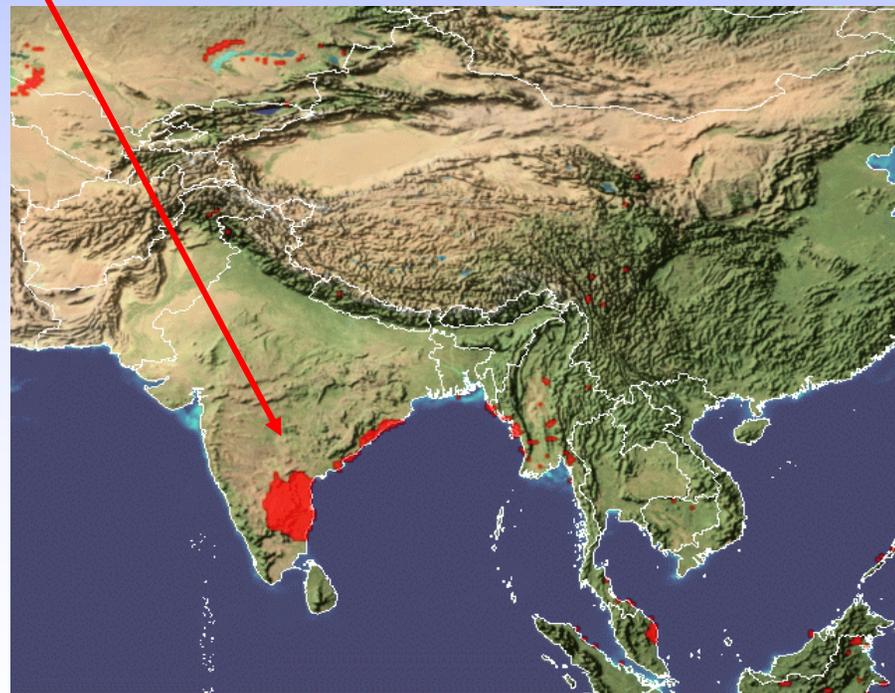
More than 100 people have died in five days of heavy rains in the southern Indian states of Tamil Nadu and Karnataka, officials say.

More than 50,000 people have been evacuated from their homes in affected areas of Tamil Nadu.

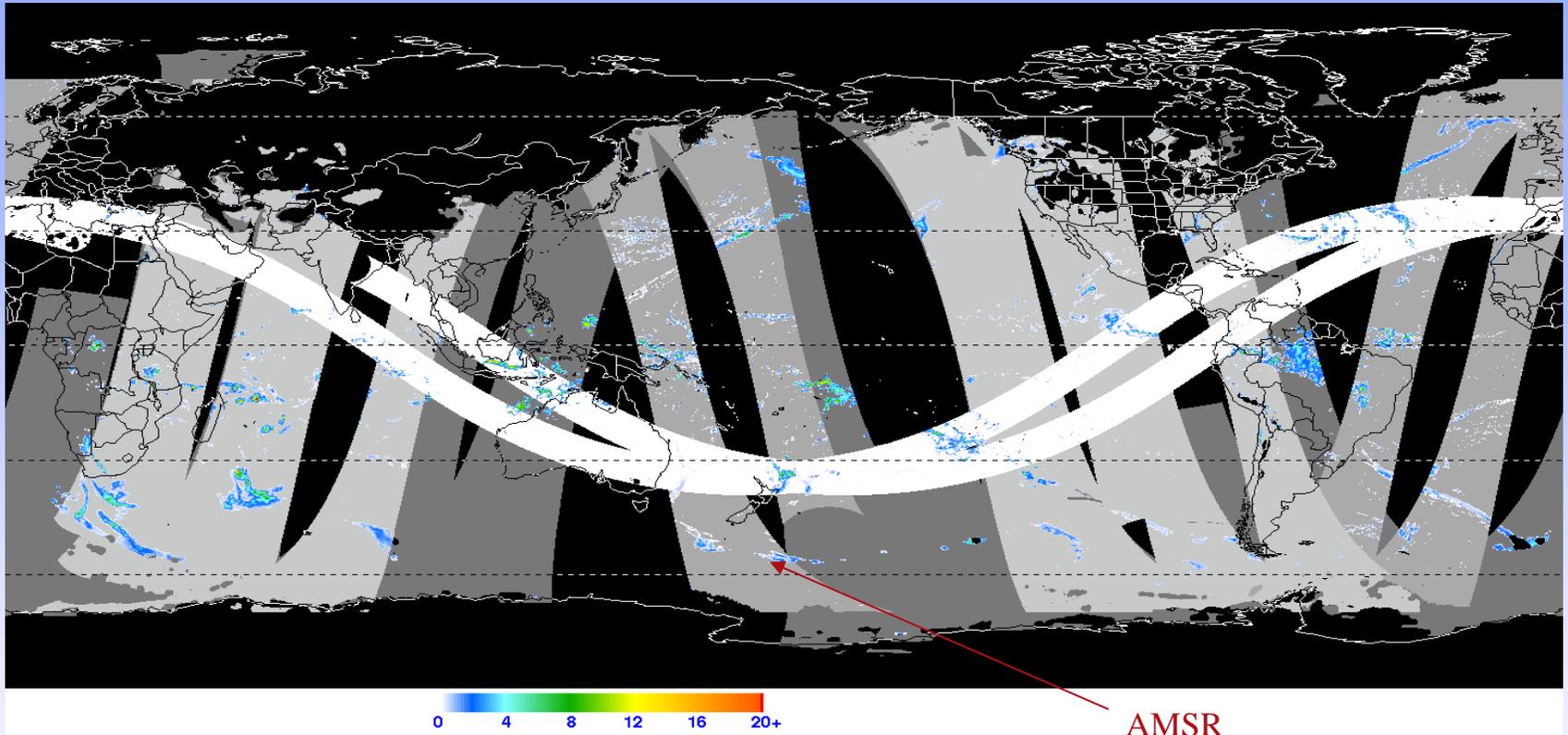
Thousands of people have been displaced and air, rail and road services hit.

From web site text page:

24 hr rainfall	131 mm	MADRAS
	214 mm	NELLORE
	234 mm	CUDDAPAH
	336 mm (13")	TIRUPATHI

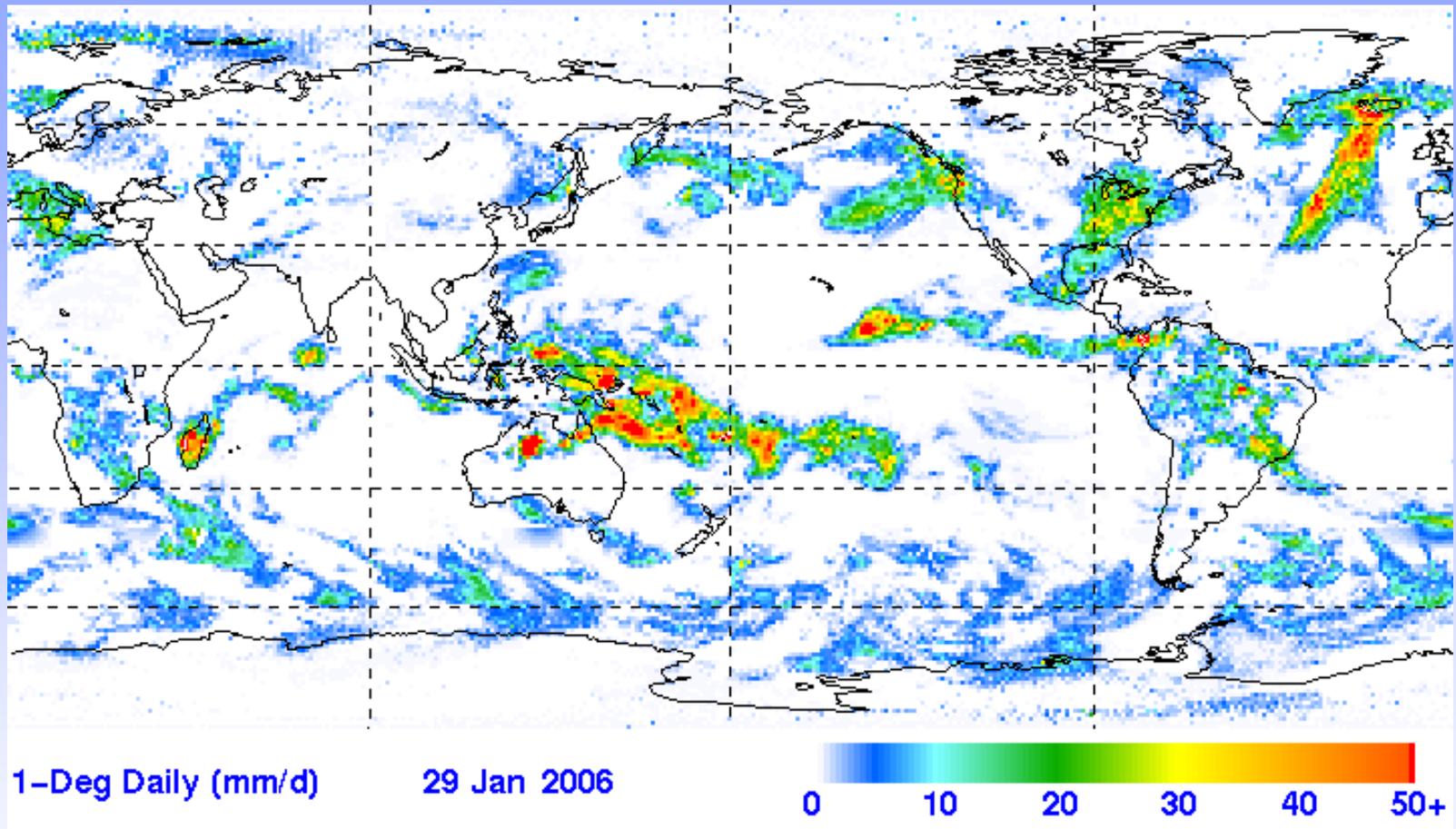


Limitations of Current 3-hr Analysis



- AMSR data added to TMPA
- TMPA has only 50°N-50°S latitudinal range
- High latitudes problematic, especially over land

Existing Globally Complete Products



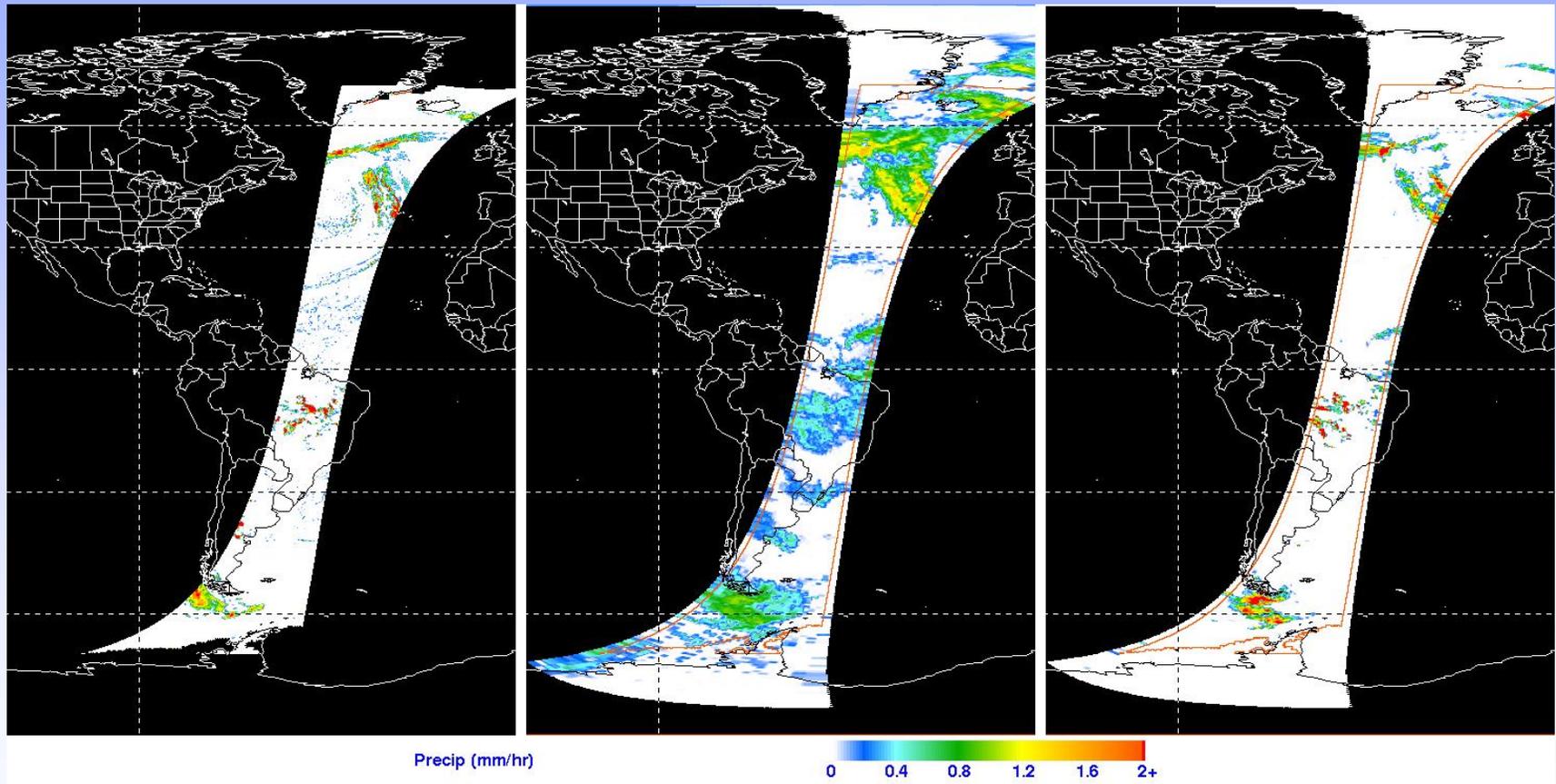
- Monthly and Daily GPCP products are globally complete using TOVS(and now AIRS)-based precipitation estimates (adapted from Susskind) in high latitudes (monthly--Adler et al., 2003; daily--Huffman et al., 2001)

Example Swaths of AMSR and AIRS Precipitation

AMSR (GPROF)

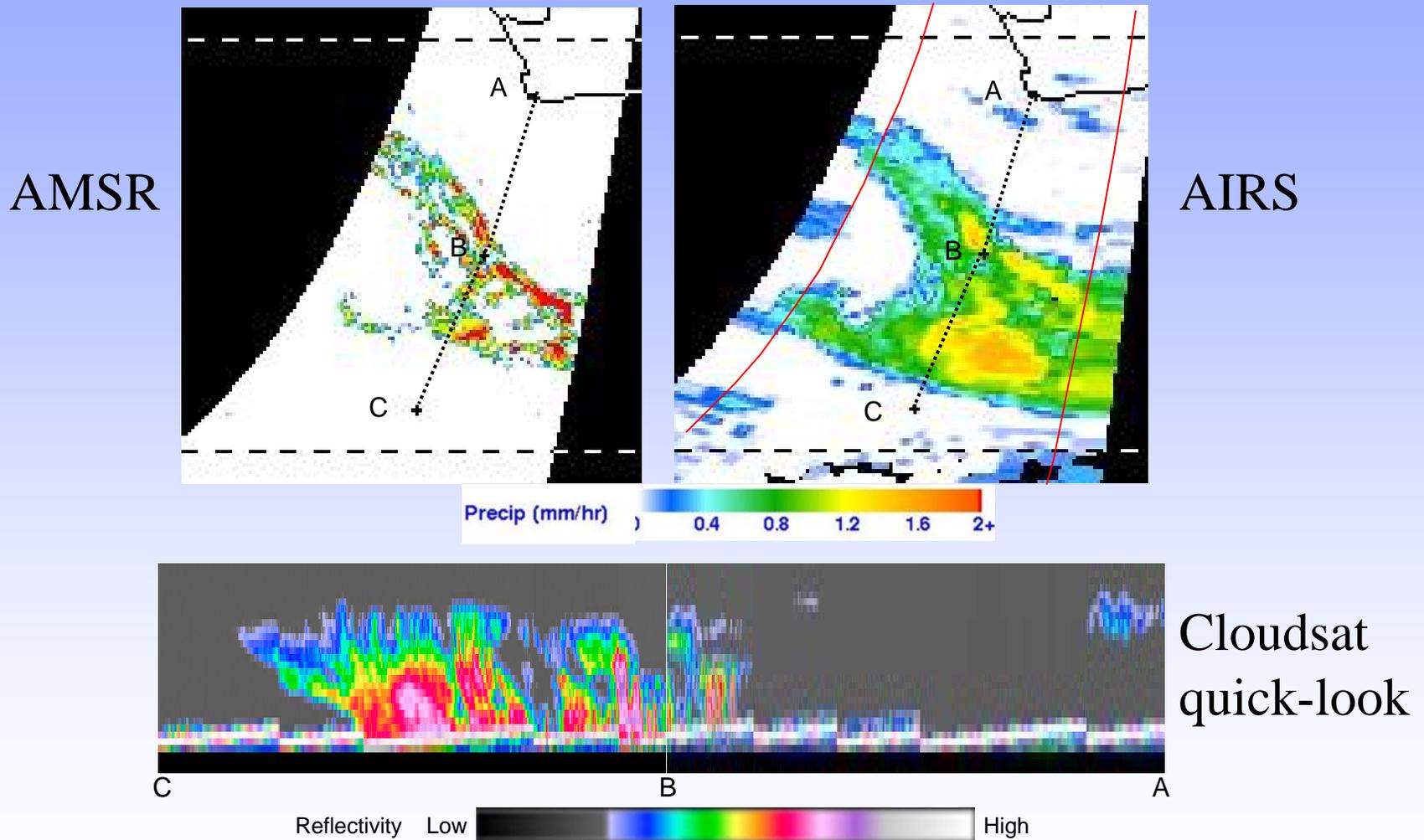
AIRS (Susskind)

AIRS (“adjusted” by AMSR)



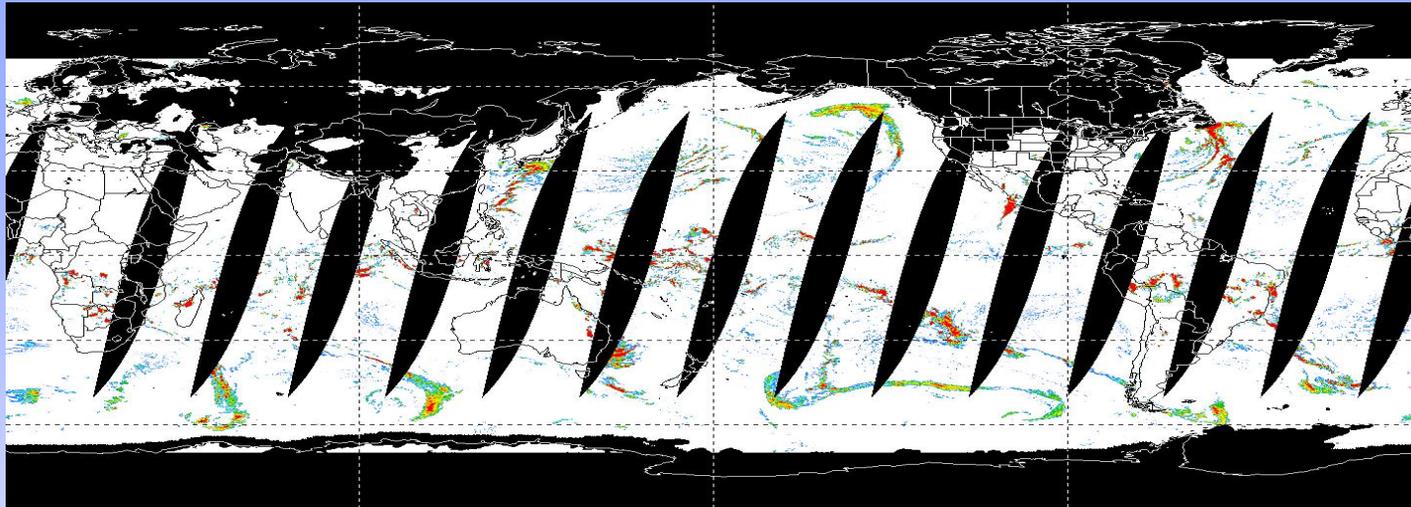
AIRS estimates are based on empirical relations of retrieved cloud thickness, moisture, etc. to surface precipitation--”adjustment” is based on pdf matching of rainrates with AMSR

Use of Cloudsat Data to Train and Test Middle/High Latitude Precipitation Estimates

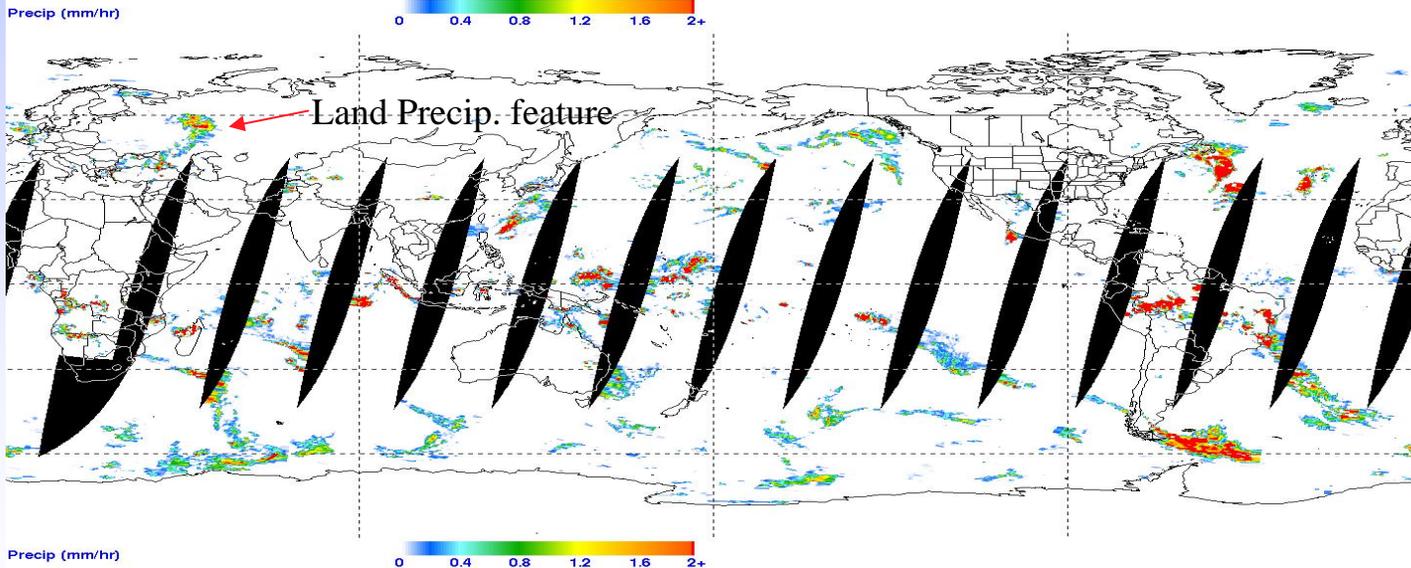


Will use Cloudsat light precipitation product when available

A Day of Descending Swaths--AMSR and AIRS



AMSR



AIRS
(preliminary
calibration)

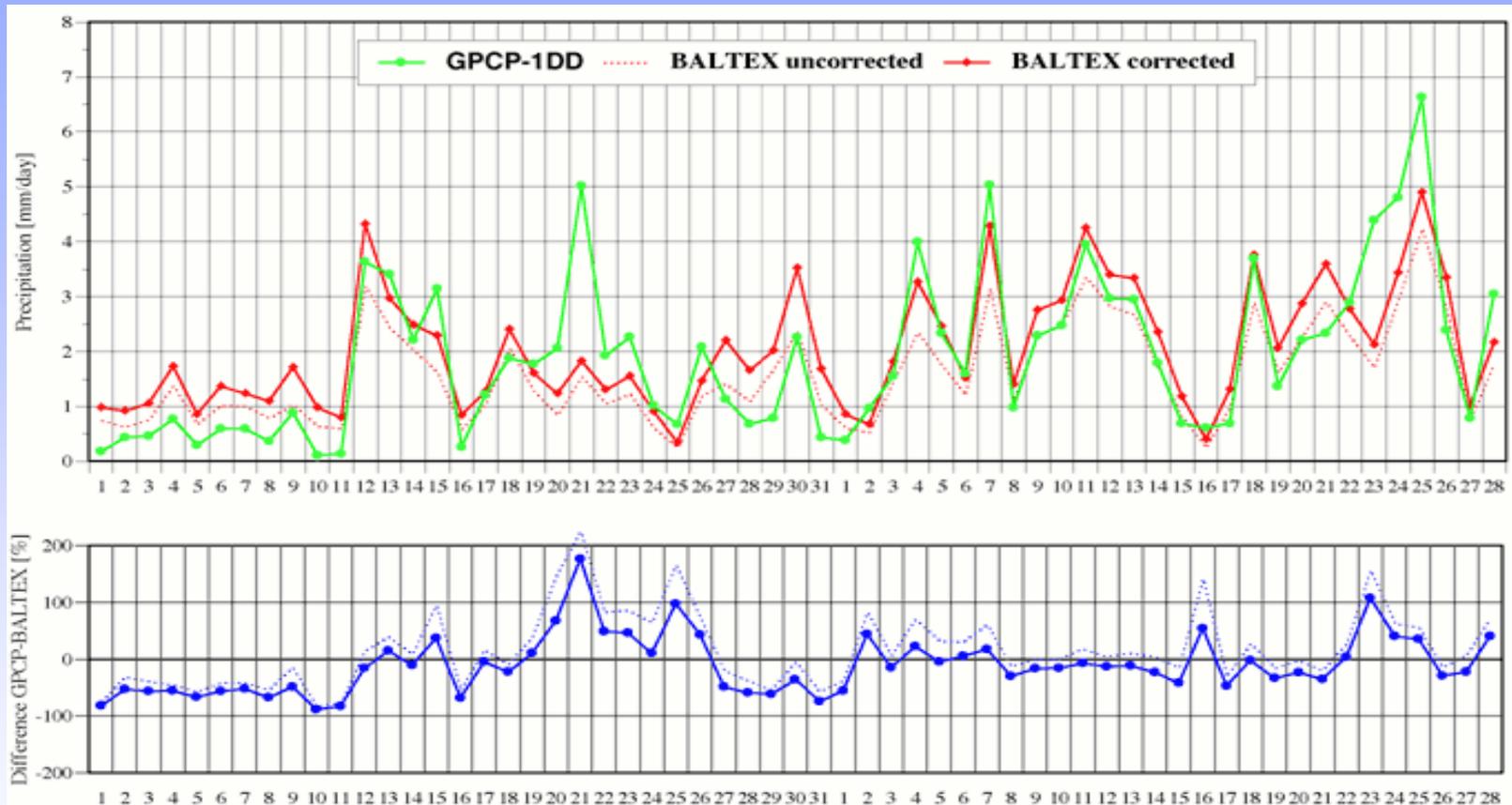
One goal--a combined AMSR/AIRS swath product

Conclusion and Future

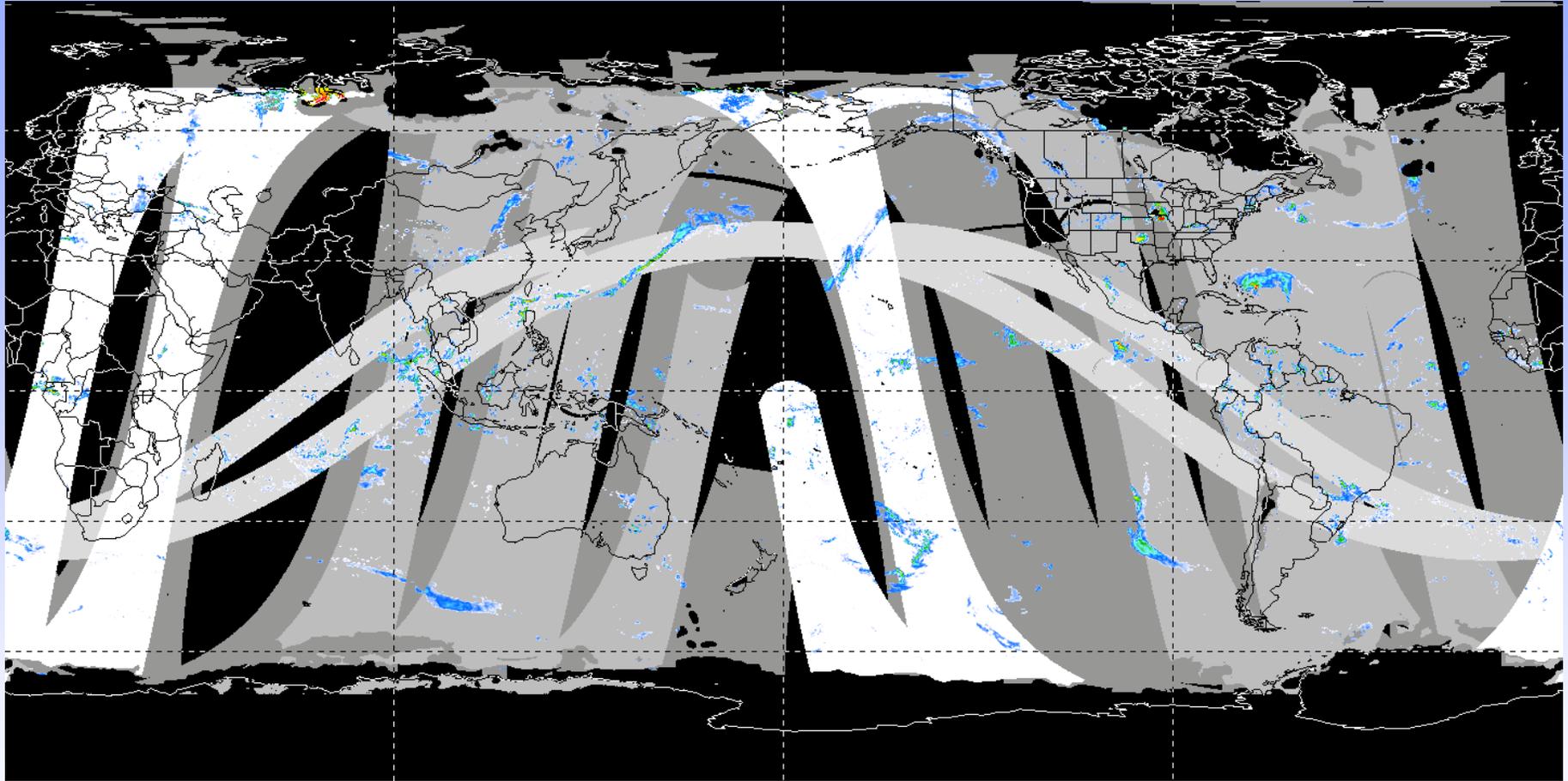
- AMSR data have been added to multi-satellite analysis (TMPA); AIRS-based estimates included in GPCP monthly and daily analysis
- AIRS-based estimates look promising as secondary precipitation estimate at instantaneous level in middle/high latitudes where microwave is missing
- Cloudsat data being used for training, evaluating, and testing passive precipitation algorithms at middle/high latitudes
- AMSR (and SSM/I, SSM/IS), AMSU (including use of 183 GHz channels), and AIRS precipitation estimates being evaluated as to absolute and relative quality to determine whether to use and in what priority
- A new AIRS (and ATOVS) precipitation algorithm will be developed using retrieved cloud and moisture parameters
- Ultimately--will produce 3-hr globally complete analysis using as much microwave-based estimates as possible and using AIRS (and ATOVS) estimates where microwave estimates are suspect and/or not available

Back-up slides

Validation of GPCP Daily Product Over Baltic Basin



TOVS-based estimates dominate at this latitude



Precip (mm/d) Aug 1987

