



# Report on Precipitation Data Construction Activities at NOAA/CPC

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# Outline

- Project Overview
- Production / Development Details
  - GPI IR-based precipitation estimates
  - Gauge-based analyses
  - CMAP monthly / pentad precipitation analyses
  - GPCP pentad precipitation analysis
  - Global full-resolution IR data set
  - CMORPH hi-resolution precipitation analysis
- Status and Schedule
- Issues
- Resources

# Overview [1]

- Goal

- To construct precipitation and associated data sets for the Global Precipitation Climatology Project (GPCP) and other research, operations, and services applications

- Source Data

- Gauge station reports
- Satellite observed IR data
- Precipitation estimates retrieved from satellite PMW
- (optional) NCEP reanalysis precipitation fields

# Overview [2]

- Deliverables
  - Full-Resolution Global TBB Data
  - Satellite IR-based global precip. estimates (GPI)
  - Gauge-based monthly / daily precipitation analyses
  - CMAP monthly / pentad global precipitation analyses
  - GPCP pentad global precipitation analyses
  - CMORPH hi-res integrated satellite precip. Estimates
- Current/expected user communities
  - GPCP Merging Center (Satellite TBB, GPI, gauge data)
  - Climate / weather / hydrology research communities
  - Operations (climate monitoring, assessments..)
  - Decision-making supports, applications in disaster mitigation, health sciences...

# Satellite IR- Based Precip. Estimates (GPI)

- Approach
  - Collect TBB histograms data from geostationary satellites
  - Define precipitation estimates from the fractional coverage of cold clouds (235K)
- Results and Accomplishments
  - Quasi real-time updates of the TBB histograms and GPI for use by the GPCP merging center in creating monthly GPCP analysis
- Product Maturity
  - Sensor Use 4 (*operational but manual*)
  - Algorithm Stability 5
  - Meta Data 5
  - Documentation 6
  - Validation 3
  - Public Release 6
  - Science & Applications 4

# Gauge- Based Analyses of Global Land Precipitation

- Approach
  - Collect monthly/daily precip. reports from CPC/CMAS, GTS and other sources
  - Define analyzed fields through interpolation
- Results and Accomplishments
  - Updated real-time from 1979
  - Used in creating GPCP and CMAP merged analyses
- Product Maturity

	<i>Monthly</i>	<i>Daily</i>
■ Sensor Use	4	4
■ Algorithm Stability	5	5
■ Meta Data	1	1
■ Documentation	6	6
■ Validation	2	2
■ Public Release	6	6
■ Science & Applications	4	4

# CMAP Monthly / Pentad Global Merged Precipitation Analyses

- Approach
  - Define precipitation analyses with improved quality by merging gauge observations, satellite estimates and precipitation fields generated by reanalysis
- Results and Accomplishments
  - Global monthly / pentad precip. analyses from 1979 ~
  - Undertainties in oceanic precip analyses examined
  - Used widely in research, operations and services (~2000 citations)
- Product Maturity
  - Sensor Use 4
  - Algorithm Stability 5
  - Meta Data 1
  - Documentation 6
  - Validation 4
  - Public Release 6
  - Science & Applications 4

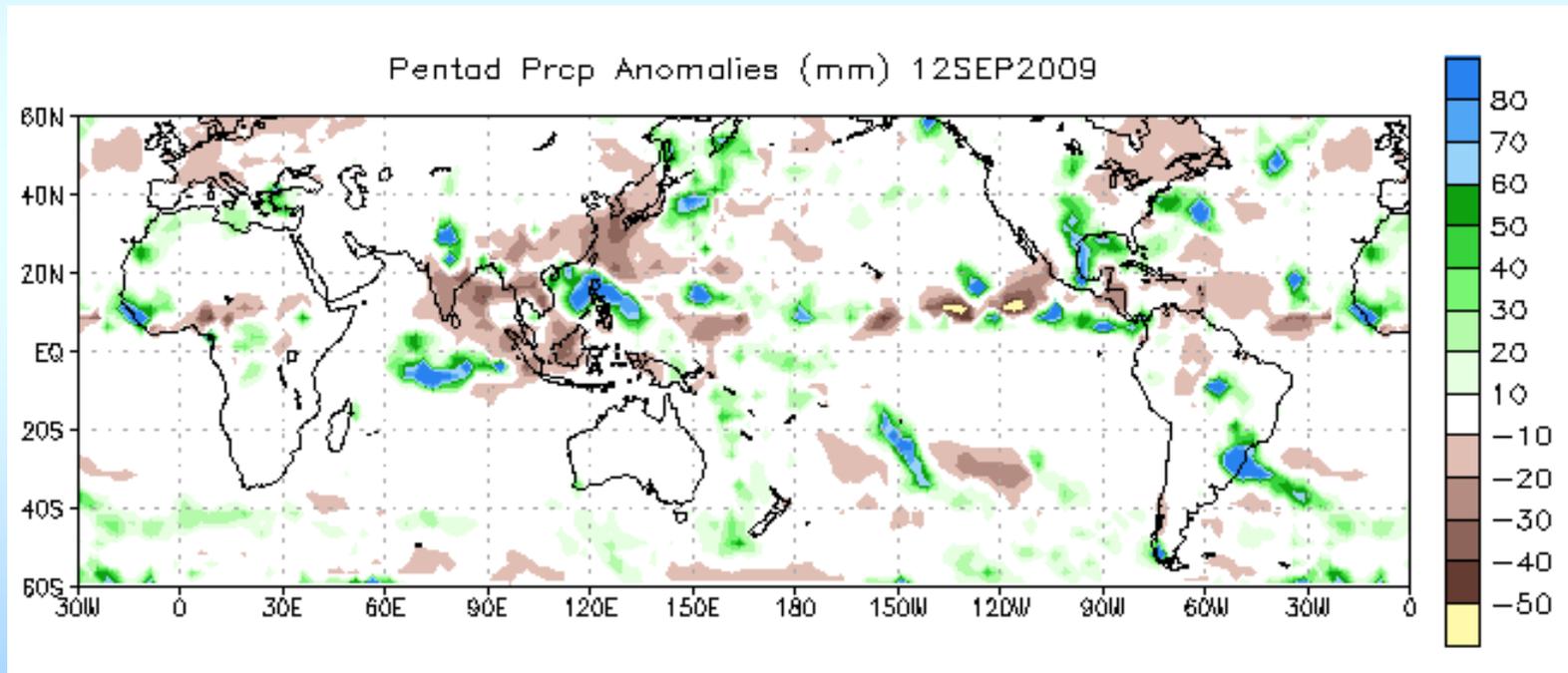
# GPCP Pentad

## Global Merged Precipitation Analyses [1]

- Approach
  - Define precipitation analyses by adjusting the pentad CMAP against the monthly GPCP
- Results and Accomplishments
  - Global pentad precip. analysis from 1979 ~
  - Real-time version available 2<sup>nd</sup> day after the end of pentad
  - Part of the GPCP official products suite
- Product Maturity
  - Sensor Use 4
  - Algorithm Stability 5
  - Meta Data 1
  - Documentation 6
  - Validation 4
  - Public Release 6
  - Science & Applications 4

# GPCP Pentad Global Merged Precipitation Analyses [2]

- Reprocessing pending (to be completed in a couple of months) to adjust the pentad analysis to GPCP monthly analysis V2.1
- Sample Real-Time Pentad GPCP for Climate Monitoring



# Global Full- Resolution TBB Data [1]

- Approach

- Integrate raw TBB data from individual geostationary satellites into a global map of TBB through calibrations and corrections

- Results and Accomplishments

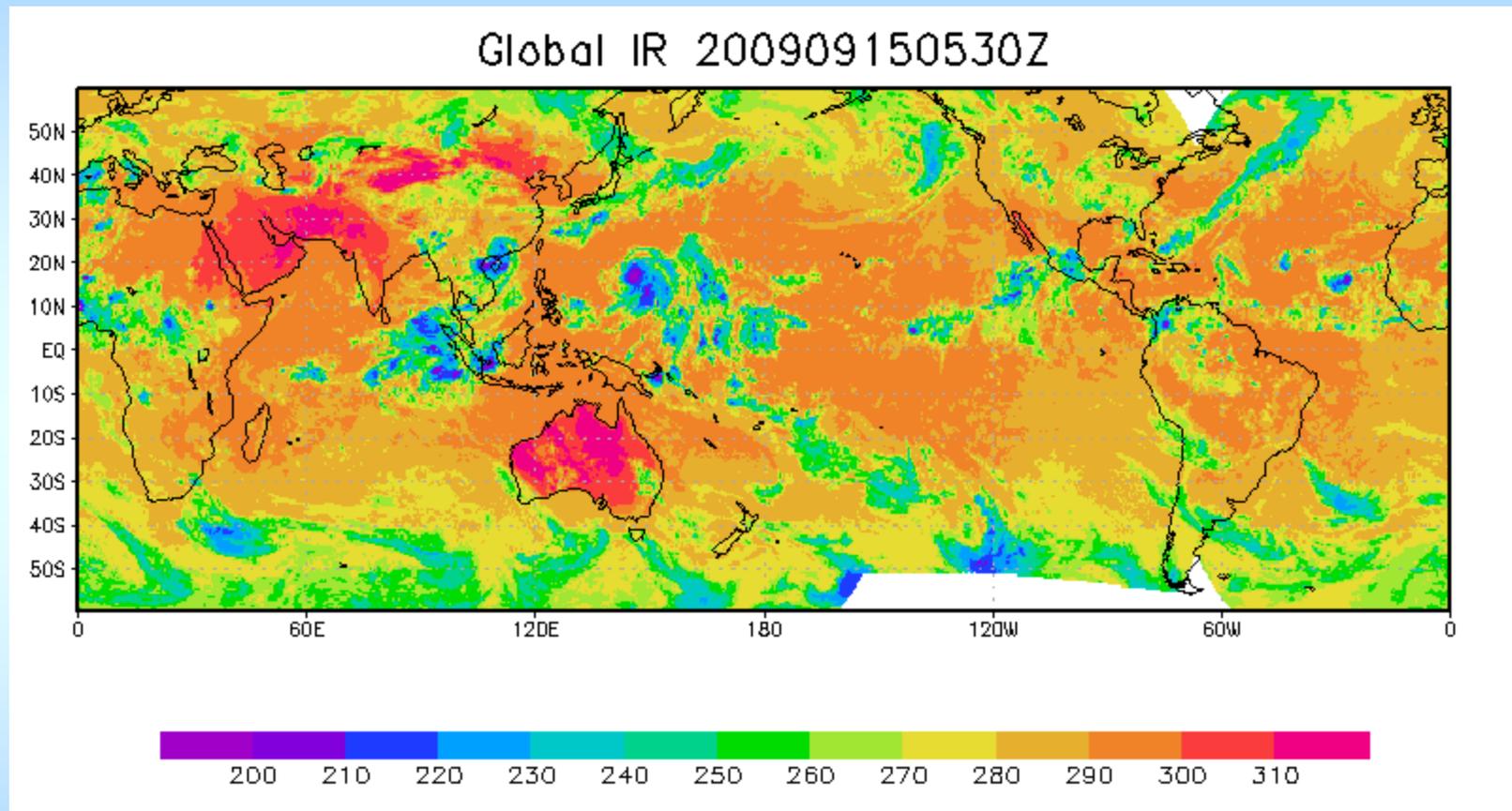
- 30-min TBB maps on 4kmx4km grids over the globe (60°S-60°N) from 1998
- Provided to GPCP and others for the construction of hi-res merged satellite precip. analyses
- Routine operation on CPC/Compute Farm but still needs heavy manual interventions

- Product Maturity

- Sensor Use 4
- Algorithm Stability 5
- Meta Data 5
- Documentation 6
- Validation 2
- Public Release 6
- Science & Applications 4

# Global Full- Resolution TBB Data [2]

- Sample Global Hi-Res TBB Data



# CMORPH Hi- Res Satellite Precip. Estimates [1]

## ■ Approach

- Compute advection vectors for the cloud / precipitation systems from consecutive IR images from geostationary satellites
- Propagate the instantaneous precipitation maps from satellite PMW observations to the targeted analysis time

## ■ Results and Accomplishments

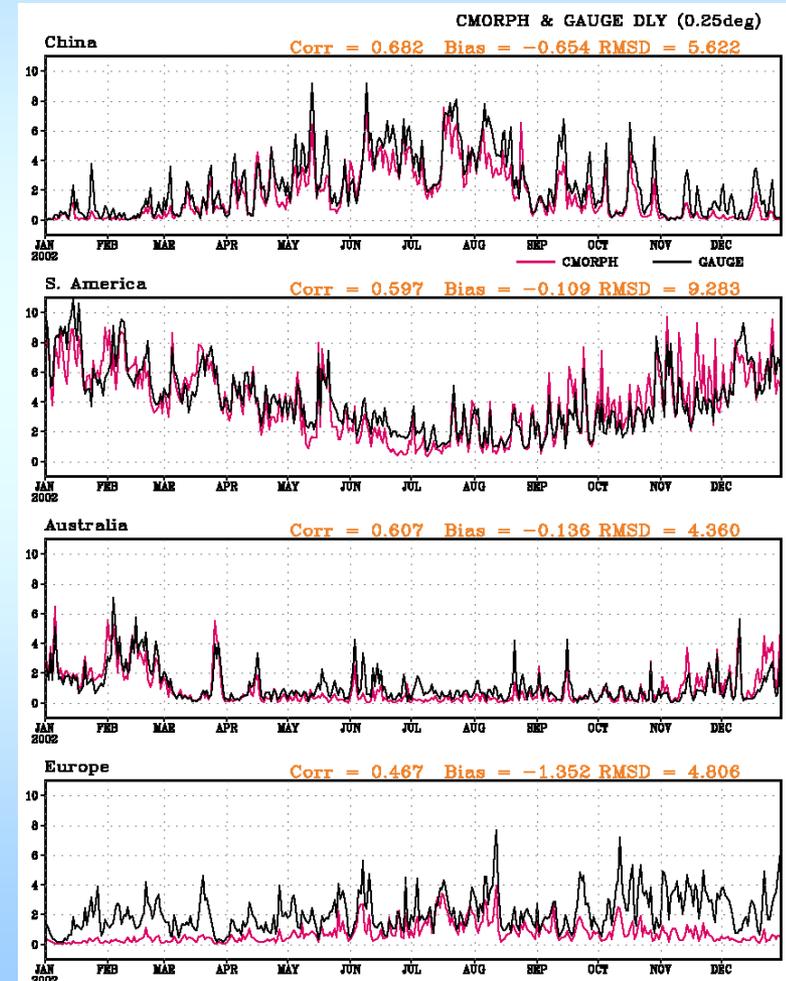
- This work is supported partially by the ARC project
- High-quality maps of 30-min precip generated real-time on an 8kmx8km grid over the globe (60°S-60°N) from Dec. 2002;
- Retrospective processing for 1998 ~ present will be complete in a couple of months
- Processing system migrated to CPC/CF but manual intervention required
- Stands out as **THE BEST product** of hi-res global precip.
- **Strong candidate for the Version 3 GPCP products**
- Further developments underway for a Kalman Filter based CMORPH with bias correction using daily gauge analysis

# CMORPH Hi- Res Satellite Precip. Estimates

[2]

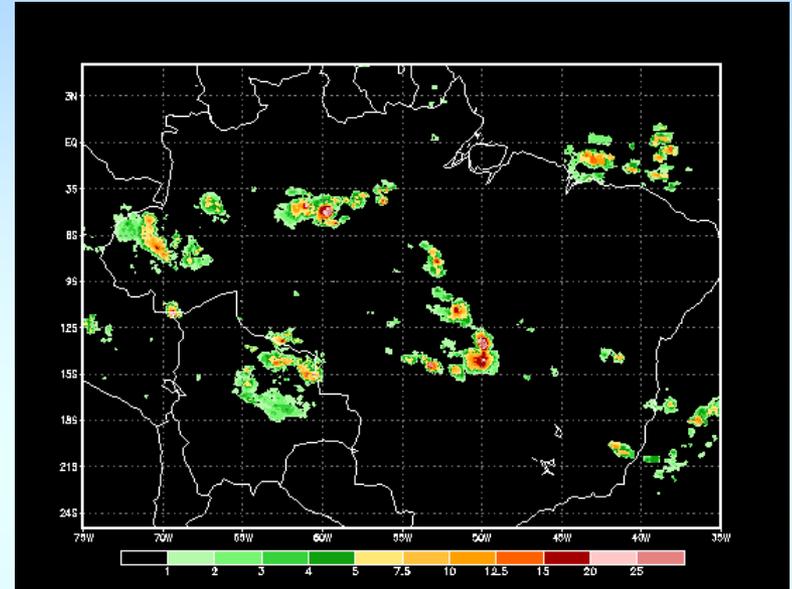
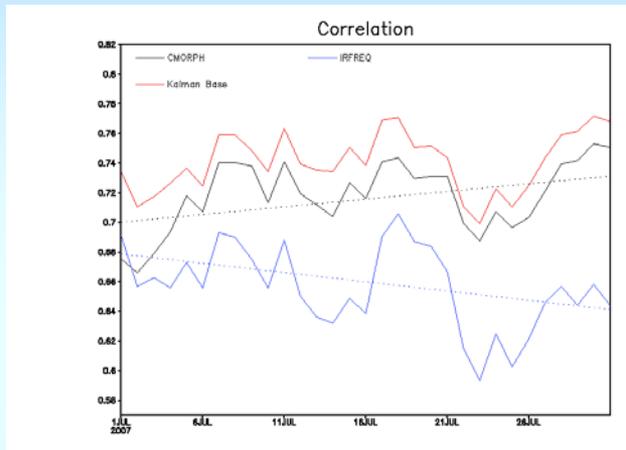
- Product Maturity
  - Sensor Use 3-4
  - Algorithm Stability 1
  - Meta Data 2
  - Documentation 6
  - Validation 4
  - Public Release 6
  - Science & Applications 4

- Reprocessing CMORPH for 1998 – present

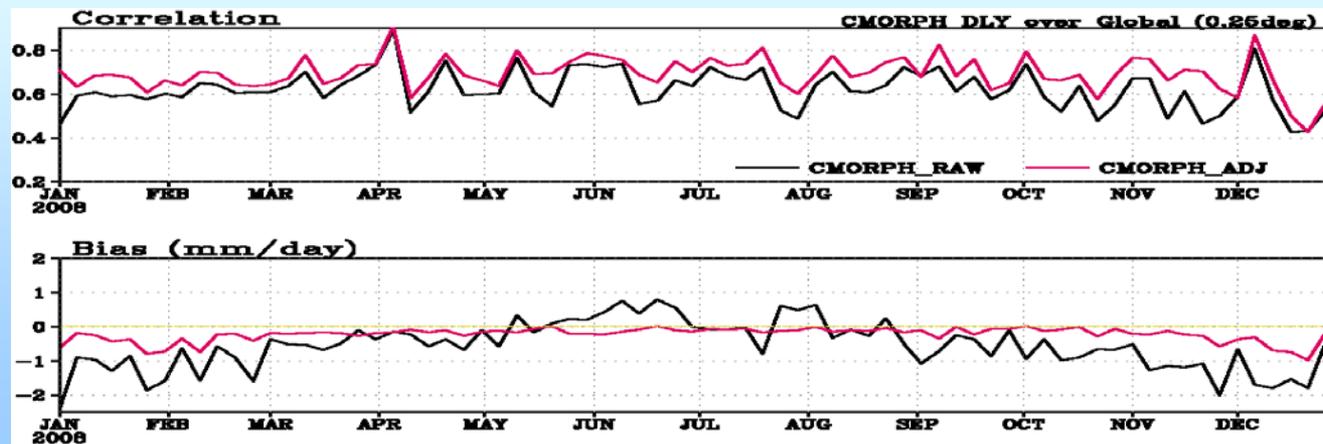


# CMORPH Hi- Res Satellite Precip. Estimates [3]

- CMORPH Improvements
  - Kalman Filter based CMORPH over South America



- Gauge-adjusted CMORPH over global land



# Status and Schedule

- **GPI IR-Based Precipitation Estimates / monthly gauge analysis**
  - Manual Operations at NOAA/CPC  
N/A for transition to automatic processing
- **Monthly / Daily gauge analysis**
  - monthly analysis updated manually
  - daily analysis migrated to CPC Compute Farm (CF)
- **Monthly / Pentad CMAP**
  - Real-time version migrated to CPC/CF
  - Standard version processed manually (for QC et al)
- **Pentad GPCP**
  - Real-time version being migrated to CPC/CF
  - Standard version processed manually
- **Full-Resolution Global IR**
  - Migrated to CPC/CF
  - Requires routine manual intervention
- **CMORPH Hi-Resolution Precipitation Estimates**
  - Current version algorithm migrated to CPC/CF
  - Requires routine manual intervention
  - Next generation algorithm under developments

# Issues

- **Transition to CPC Compute Farm**
  - Manual intervention needed even after the transition to CPC/CF
- **Routine Updates of Operational Data Sets**
  - Several data sets requires routine manual updates due to the limitation of input data sets et al
- **Reprocessing of Operational Data Sets**
  - Reprocessing is needed for some data sets (e.g. GPCP pentad analysis) due to project requirements and/or algorithm upgrades
- **Improving Operational Data Sets**
  - Data sets need to be improved as problems are detected and new techniques become available

# Resources

- **Number of personnel employed for project**
  - 10% of a senior contractor working on hi-level technical problems
  - 70% of a low level experienced contractor working on routine maintenance
- **Key equipment or observatories used**
  - CPC Compute Farm
  - CPC Servers / Work Stations with tape drivers
- **Key collaborating projects or personnel**
  - GPCP, Program Manager : R. Adler ESSIC/UMD
- **NOAA points-of-contact**
  - Pingping Xie; NOAA / CPC
- **Target NOAA Data Center**
  - NOAA Climate Prediction Center

**Thank You Very Much  
for Supporting Us on This Project !!**