



CGMS-36, NOAA-WP-19  
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## **REPORT ON NESDIS SATELLITE PRECIPITATION AND VALIDATION ACTIVITIES**

In response to CGMS Action 35.22 CGMS Members to report on precipitation estimation and validation activities at CGMS-36

NOAA WP-19 presents a broad overview of the satellite based precipitation and validation activities where NOAA/NESDIS is actively involved. Also included are near-term (1-3 years) milestones.



## Introduction

This document presents a broad overview of the satellite based precipitation and validation activities where NOAA/NESDIS is actively involved. Also included are near-term (1-3 years) milestones.

## GOES satellite based activities

### Current GOES

NOAA/NESDIS continues to generate Hydro-Estimator (H-E) rainfall estimates over the CONUS and surrounding regions and to distribute these data to NOAA / National Weather Service field forecasters via the Advanced Weather Information Processing System (AWIPS).

NOAA/NESDIS also continues to produce H-E globally on a real-time (but non-operational) basis in support of users such as the flash flood forecasting projects over Central America and the Mekong River Basin in Southeast Asia that are being carried out by the Hydrologic Research Center and the World Meteorological Organization.

### GOES-R preparation

NOAA/NESDIS' GOES-R Algorithm Working Group (AWG) Hydrology Algorithm Team (AT) has completed an intercomparison of several candidate algorithms to be used in the production of rainfall rate, 0-3 hour rainfall potential, and 0-3 hour probability of rainfall for the GOES-R Advanced Baseline Imager (ABI). The selected algorithms are in the process of being documented and the source code is being made ready for operational implementation. Additional improvements to these algorithms will be investigated and implemented prior to finalization of the pre-launch code.

## POES satellite based activities

NOAA/NESDIS continues to generate operational swath and gridded precipitation estimates for all of the operational and backup POES satellites (NOAA-15, -16, -17, -18, MetOp-A) utilizing the Advanced Microwave Sounding Unit (AMSU) and Microwave Humidity Sounder (MHS) sensors. Work continues on the validation and transition of a snowfall rate algorithm as part of this product. Under development is a hydrometeor profile retrieval from AMSU and MHS (i.e., liquid and ice water vertical distribution).

NOAA/NESDIS also continues to support the DMSP Special Sensor Microwave/Imager (SSM/I) and Special Sensor Microwave Imager/Sounder (SSM/I/S) rainfall rate product that is generated at Fleet Numerical Meteorology and Oceanography Center (FNMOC). Recent activities include examining the effects of a change at a high frequency channel between SSM/I (85 GHz) and SSM/I/S (91 GHz) and utilization of higher frequencies on SSM/I/S (150 and 183 GHz) for improved precipitation retrievals over land. Additionally, NESDIS continues to generate a SSM/I pentad and monthly rainfall climatology for the entire data record (July 1987 to present).

## Other satellite activities

Blended techniques (i.e., combining GOES and POES)



NOAA/NESDIS continues to improve the Self-Calibrating Multivariate Precipitation Retrieval (SCaMPR) technique, which is now performing on a level comparable to the operational H-E. After the next set of modifications this fall, NOAA/NESDIS will begin considering SCaMPR for replacing the H-E if performance warrants it.

In addition, NOAA/NESDIS also continues to interact closely with NASA on Tropical Rainfall Measuring Mission (TRMM) Microwave Imager (TMI) and EOS-Aqua Advanced Microwave Scanning Radiometer (AMSR)-E precipitation retrievals over land. Additionally, NOAA is engaged with NASA and JAXA (Japan Aerospace Exploration Agency) on several activities related to the Global Precipitation Measurement (GPM) mission. Furthermore, NOAA/NESDIS is developing collaborations with JAXA on the Global Change Observing Mission (GCOM).

Also, NOAA/NESDIS continues to provide satellite rainfall estimates to the Global Energy and Water cycle Experiment (GEWEX) Global Precipitation Climatology Project (GPCP). This includes both SSM/I (NESDIS) and geostationary IR (NCEP) derived products.

#### Validation Activities

NOAA/NESDIS is engaged in several validation activities that help monitor and improve its satellite based precipitation estimates. This includes the preparation, QC and utilization of high quality radar and rain gauge data sets.

Additionally, NOAA/NESDIS leverages off of several excellent quality field campaign data sets developed by NASA and the international science community to better understand the precipitation microphysics and its relationship to satellite measurements.

Finally, NOAA develops and utilizes several ground based data sets that are part of the CGMS/International Precipitation Working Group (IPWG) global validation network.

#### National and International Activities

NOAA/NESDIS remains actively involved in several programs and working groups related to the research and application of satellite based precipitation estimates. On the national level, this includes NOAA's Hydrometeorological Testbed (HMT), NOAA's National Mosaic and Multi-Sensor WPE (NMQ) project; NASA's EOS-Aqua, TRMM and GPM projects. Internationally, NESDIS scientists are active participants in the GEWEX/GPCP, NASA/JAXA GPM planning workshops, the CEOS precipitation constellation, and the CGMS/IPWG.

#### Upcoming Plans/Milestones

- Generate microwave derived precipitation products from NOAA-N' (2009) and NPP (2010).
- Examine the quality of DMSP SSM/IS precipitation products from DMSP F-18 (2009).
- Consider SCaMPR as an operational replacement for the H-E if performance warrants (2009).
- Deliver the recommended rainfall rate, probability of rainfall, and rainfall potential ground system code and documentation to the GOES-R System Prime contractor (2010).
- Continued production of the SSM/I precipitation time series and inclusion of SSM/IS, and delivery to GPCP (2008 – 2010).



Continued participation and algorithm development/delivery to NASA's TRMM and GPM programs (2008 – 2010).

Continued participation in national and international programs (2008-2010).