

# Research Highlights from the International Precipitation Working Group (IPWG)

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**Vincenzo Levizzani** (CNR-ISAC)

**Ralph Ferraro** (NOAA STAR)

# What is IPWG?

- IPWG was established as a permanent Working Group of the Coordination Group for Meteorological Satellites ([CGMS](#)) in 2001.
- The IPWG is co-sponsored by CGMS and the World Meteorological Organization ([WMO](#)).
- Focused on operational and research satellite based quantitative precipitation measurement issues and challenges.
- Provides a forum for operational and research users of satellite precipitation measurements to exchange information.
- IPWG fosters:
  - Development of better measurements, and improvement of their utilization;
  - Improvement of scientific understanding;
  - Development of international partnerships.



# IPWG Meetings

- Under the lead of the two Co-Chairs, the IPWG organizes Workshops, co-sponsored by CGMS and WMO, approximately every two years.
- The Workshops promote the exchange of scientific and operational information between the producers of precipitation measurements, the research community, and the user community.

IPWG-1: Madrid (2002)

IPWG-2: Monterey (2004)

IPWG-3: Melbourne (2006)

IPWG-4: Beijing (2008)

IPWG-5: Hamburg (2010)

IPWG-6: São José dos Campos (2012)

IPWG-7: Tsukuba (2014)

IPWG-8: Bologna (2016)

IPWG-9: Seoul (2018)



# Working Groups

	Chairs	
Validation	Chris Kidd <i>NASA/GSFC, US</i>	Marielle Gosset <i>OMP/GET, France</i>
Research	Ali Behrangi <i>NASA/JPL, US</i>	Yeji Choi <i>KMA, Korea</i>
Applications	Ziad Haddad <i>NASA/JPL, US</i>	Daniel Vila <i>CPTEC/INPE, Brazil</i>
Data Assimilation	Benjamin Johnson <i>NOAA/NESDIS, US</i>	Philippe Chambon <i>Météo-France, France</i>
Scattering	Ian Adams <i>NASA/GSFC, US</i>	Alan Geer <i>ECMWF, UK</i>

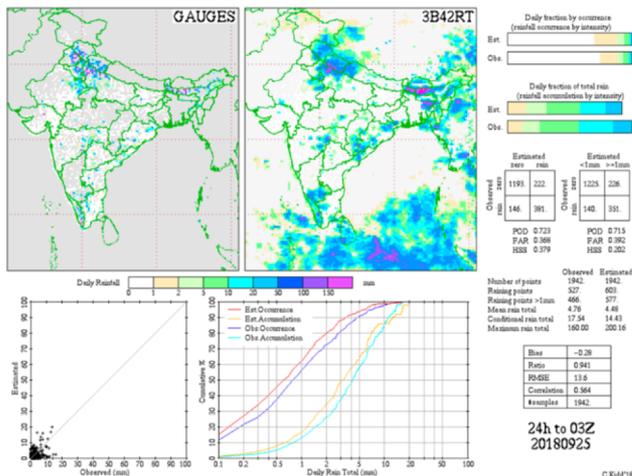
# Science Highlight: Validation 1

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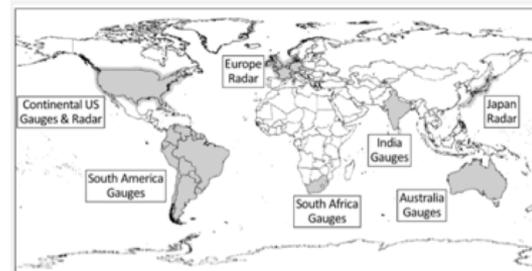
**Establishing an IPWG validation site for satellite precipitation products over India.**

Chris Kidd<sup>1,2</sup>, Virendra Singh<sup>3</sup>, A K Mitra<sup>3</sup>, Amit Kumar<sup>3</sup> and S K Mukherjee<sup>3</sup>.

<sup>1</sup> Earth System Science Interdisciplinary Center, University of Maryland, College Park,  
<sup>2</sup> NASA/Goddard Space Flight Center, Greenbelt, USA.  
<sup>3</sup> National Meteorological Satellite Centre, India Meteorological Department, New Delhi, India.



A new validation site over India in addition to the US, South America, Japan, Europe, Australia



# Science Highlight: Validation 2



## Ocean Rain And Ice-phase precipitation measurement Network The Global Ocean Surface Reference Dataset for all Water Cycle Components

Christian Klepp<sup>1,2,3</sup>, Simon Michel<sup>2</sup>, Paul Kucera<sup>4</sup>, Alain Protat<sup>5</sup>, Jörg Burdanowitz<sup>2,3</sup>

9 permanent and 6 campaign data ships



OceanRAIN Release 1.0:

Jun 2010 to April 2017

> 6.83 million minutes of data from 8 ships

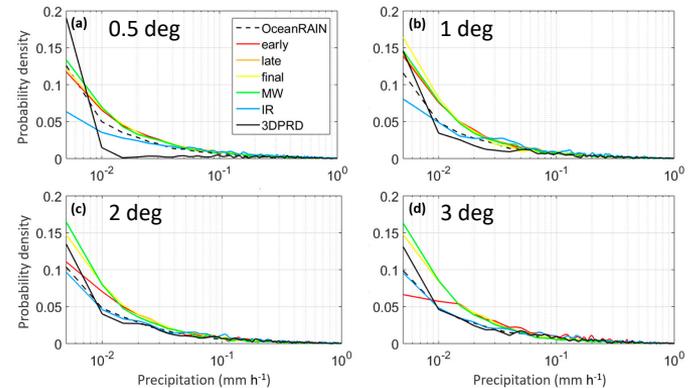
## Article Assessment of Level-3 Gridded Global Precipitation Mission (GPM) Products Over Oceans

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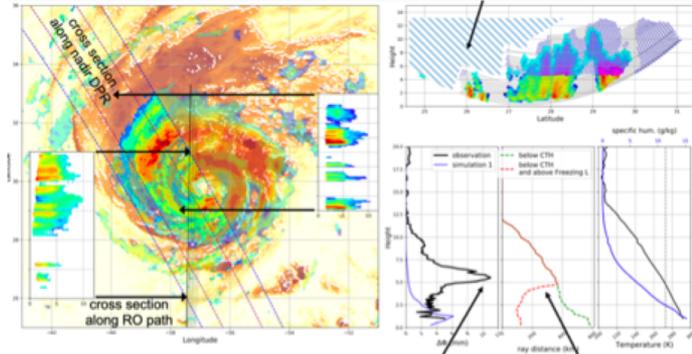
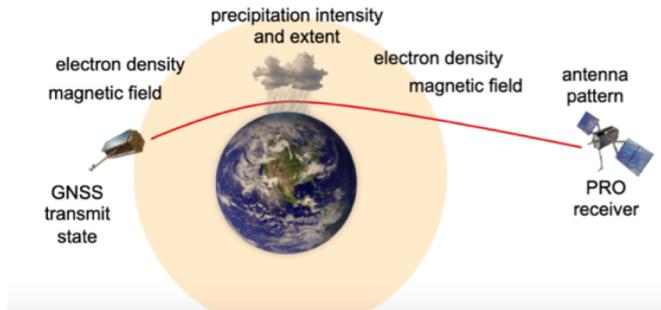


Probability density functions of GPM precipitation products and OceanRAIN precipitation over the Pacific and Atlantic Oceans during March 2014–February 2017

# Science Highlight: New ways of observing precipitation

## Polarimetric Radio Occultations

F. Joseph Turk, E. Cardellach, R. Padullés,  
C. O. Ao, M. de la Torre Juárez, S. Hristova-Veleva, J. David Neelin



## Rainfall retrieval from commercial microwave links

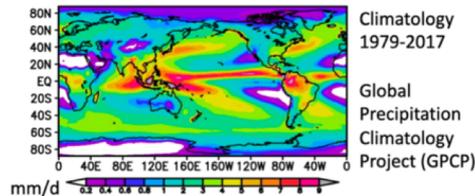
Marielle Gosset, Matias Alcoba, Frederic Cazenave, Maxime Turko, Apoline Yapi, Modeste Kacou, François Bella, Evrad Kamtchoum, Armand Nzeukou



# Science Highlight: Research

## Climate Monitoring of Global Precipitation Means, Trends and Intensity Changes Over the Satellite Era

Robert Adler, Guojun Gu, Jian-Jian Wang (University of Maryland)  
George Huffman (NASA Goddard Space Flight Center)

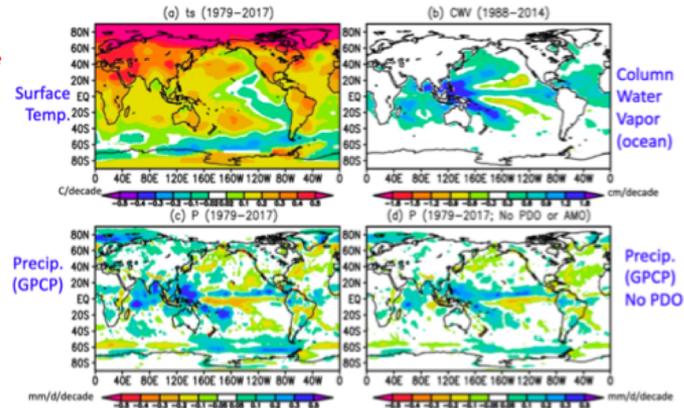


GPCP is an international (GEWEX) collaborative effort resulting in an often-used analysis based on satellite and gauge data (1979-near present). Adler et al., 2017 *Rev. Geophysics*; Adler et al., 2018 *Atmosphere*

⇒ Need continuity of conical scanning microwave imagers for a homogeneous climate data record

GPCP Monthly Analysis provides high quality, long-term global precipitation information, including a “real-time” climate monitoring product

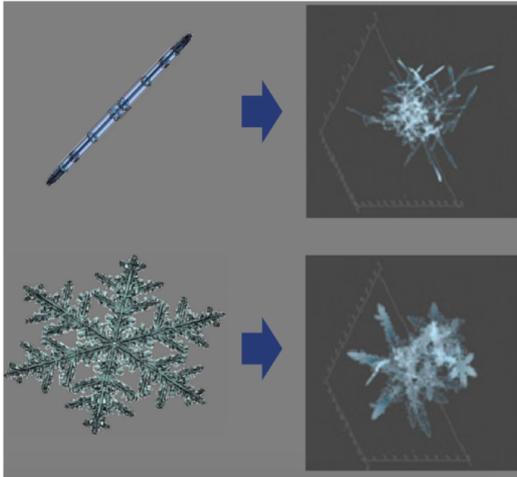
## Trend Patterns



# Science Highlight: Data Assimilation and Scattering

## Three-Dimensional Sensor Forward Modeling of Clouds and Precipitation in the Multi-Instrument Inverse Solver Testbed

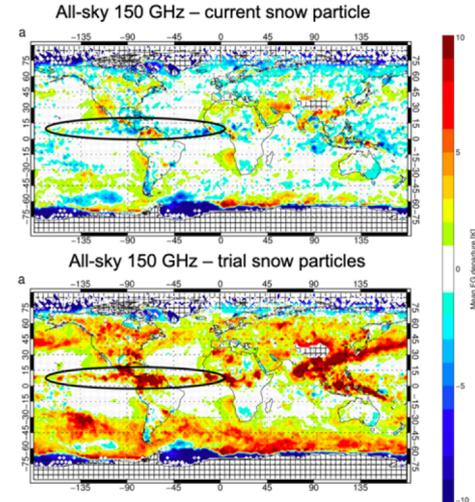
Ian S. Adams, S. Joseph Munchak, Kuo-Sen Kuo, Craig Pelissier, Thomas Clune, and Rachael Kroodsma



⇒ The computation of single scattering properties of frozen hydrometeors reaches a high degree of realism (e.g. 3D aggregates) for accurate and consistent forward modeling of multi-frequency observations

## Prospects for assimilating micro- and macrophysical details of precipitation in global weather forecasting

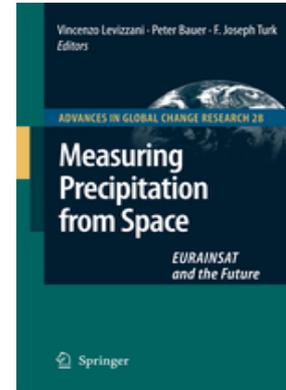
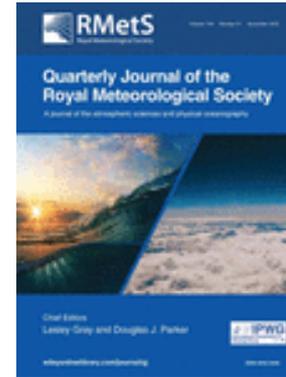
Alan Geer, Richard Forbes, Philippe Lopez, et al



⇒ More advanced radiative transfer can also highlight forecasting model biases

# IPWG Scientific Outreach

- IPWG-8 Special Issue in the QJRMS (29 papers!)
- IPWG-9 Special Issue in the Asia-Pacific Journal of Atmospheric Sciences (APJAS)
- “Satellite Precipitation Measurement”, Ed. Levizzani, Springer (Forthcoming 2019)
- Training lectures by experts in the area at the bi-annual meeting



## IPWG-10 / IWSSM-6

- Joint meeting with IWSSM (International Workshop on Space-based Snowfall Measurement)
- June 1-5, 2020
- Meeting location: Fort Collins, USA
- Host: Cooperative Institute for Research in the Atmosphere, Colorado State University

