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## **PRECIPITATION PRODUCTS: IPWG matters**

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### **Summary and Purpose of Document**

This document reports on the status of the IPWG activities as reported to CGMS-39. Special interest should be devoted to the upgraded IPWG website which lists now publicly available precipitation datasets and also validation datasets.

In spring 2011 an international workshop on space-based snowfall measurements was held in Grainau, Germany and relevant recommendation to satellite operators were formulated.

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### **ACTION PROPOSED**

The sixth session is invited to take note of the progress of IPWG and the related recommendations to CGMS-39.

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## PRECIPITATION PRODUCTS: IPWG MATTERS

### Introduction

In 2011 no face to face meeting of IPWG took place. However, the Third International Workshop on Space-Based Snowfall Measurement was held in March/April 2011 in Grainau, Germany. The workshop was endorsed by the International Precipitation working group (IPWG), the GEWEX Radiation Panel (GRP) and NASA's Global Precipitation Measurement (GPM) and CloudSat Missions. During the workshop, the snowfall community expressed its confidence in the capabilities of space-borne multi-frequency Doppler radar for global snowfall measurement, and they urged national space and science agencies to plan missions that implement this capability at a minimum. These capabilities could be greatly enhanced through the following technological advances: (1) reduced radar pulse width to enhance near surface detectability and (2) the inclusion of a sub-millimetre-wave radiometer to provide additional constraints on ice water path and constrain ice particle sizes. It was also stated that there is convergence on the importance of radars and radiometers in addressing the observational gaps left open by current missions. However, observations from lidar and far-IR passive sensors are useful (and necessary for certain goals) and they complement the radar and radiometer measurements. If such instruments cannot be included in a given mission, synergies with other missions operating in the same timeframe (e.g. A-Train) should be explored, encouraged and coordinated.

Based on this discussion, the following recommendations to CGMS operators were formulated:

**The snowfall community is confident in the capabilities of Space-borne multi-frequency Doppler radar for global snowfall measurement and requests space research agencies to plan future missions that implement double-frequency capability as a minimum.**

**Space agencies should continue to favour integrated science teams that encompass the measurement, modelling and data assimilation communities through proposals, campaigns and free dataflow.**

NOAA reported on issues related to obtaining rainfall datasets over South Africa for validating NOAA and EUMETSAT satellite rainfall products. Because the intensity and frequency of rainfall and the physical mechanisms involved (e.g., convective vs. stratiform; orographic enhancement via the "seeder-feeder mechanism") vary considerably in both time and space, validation data are needed over as wide a variety of climate regimes and seasons as possible to develop robust algorithms and properly evaluate their performance.

However, obtaining ground validation datasets of suitable quality at short time scales (instantaneous to 3 h) has proven to be exceedingly difficult. The Nimrod radar/gauge dataset provided by the British Atmospheric Data Centre (BADC) has provided excellent ground validation data for all 3 GOES-R algorithms over Western Europe, while the Tropical Rainfall Measuring Mission (TRMM) Precipitation Radar (PR) has been highly useful for validating the Rainfall Rate algorithm over the tropics and lower midlatitudes. High-quality rainfall datasets have otherwise been quite difficult to obtain aside from very limited datasets associated with field campaigns such as the NASA African Monsoon Multidisciplinary Analyses (NAMMA) and the planned Chuva project over Brazil.

A collaboration between EUMETSAT, NOAA, and the South African Weather Service (SAWS) to develop a high-quality validation dataset for satellite rainfall product development and validation would be highly valuable to the research and operational communities. NOAA intends to participate in any proposed collaboration. SAWS has in the past contributed to the IPWG activities. In the discussion NOAA commented that they would also be very interested to get ground validation datasets, especially radar data, for verification of current and future satellite products. In so far the cooperation with SAWS would be a very good opportunity for the establishment of a satellite product testbed making use of the SEVIRI instruments data. This would offer possibilities for EUMETSAT and NOAA to test and further develop new products for use by African and other weather services. The WMO was asked to take the

action to inform SAWS about this initiative for joint product validation. This collaboration can be achieved either in the framework of IPWG, or bilaterally with EUMETSAT, NOAA or other international partners.

NASA provided a comprehensive report on NASA's contributions to precipitation remote sensing. The Tropical Rainfall Measuring Mission (TRMM), launched in late 1997, is a joint mission between NASA and JAXA, the Japanese space agency. The first-time use of both active and passive microwave instruments and the processing, low inclination orbit (35°) have made TRMM the world's foremost satellite for the study of precipitation and associated storms and climate processes in the tropics. TRMM has met and exceeded its original goal of advancing our understanding of the distribution of tropical rainfall and its relation to the global water and energy cycles. TRMM has evolved from an experimental mission focusing on tropical rainfall climatology into the primary satellite in a system of research and operational satellites used for analyzing precipitation characteristics on time scales from 3-hr to inter-annually and beyond. Continuation of TRMM data will allow the community to better link the TRMM dataset to that of the Global Precipitation Measurement (GPM) mission to be launched in 2013.

As part of the original 3 years of the mission NASA funded field experiments as part of TRMM. These experiments focused on the microphysics of weather systems. Their aim was to provide information that would improve the TRMM retrieval algorithms as well as provide comparative data points. This combination of ground validation and space mission is part of the synergistic approach to NASA mission planning. Four important field experiments were funded: TEFLUN-A/B, TRMM-LBA, KWAJEX. All contributed to continuous improvement of TRMM retrieval algorithms as well as increasing our understanding of weather in the tropics. The follow-on activities by GPM will also include validation campaigns.

**CGMS agencies are encouraged to follow NASA's example of comprehensive and sustaining science support for satellite missions, including comprehensive validation campaigns.**

The International Precipitation Working Group (IPWG) highlighted that in 2011 special emphasis was given to recent achievements, especially:

- IPWG compiled lists of publicly available, quasi-operational and quasi-global precipitation datasets which is available through the IPWG website at: <http://www.isac.cnr.it/~ipwg/data/datasets.html>.
- IPWG had carried out a survey of different sources of validation rainfall data; the datasets lists are also available on the website together with a list of applications using high resolution satellite precipitation products.

IPWG also informed CGMS that in October 2012 the IPWG-6 meeting will take place in Brazil (Fortaleza) together with a collocated training workshop. Therefore the CGMS operators were asked:

**Satellite operators are requested to provide funding for participants of the 6th IPWG Workshop which will take place in Fortaleza, Brazil (tentatively 15-19 October 2012) and CGMS members are invited to assist the funding of a training event which is planned to be held concurrently with IPWG-6.**

Certainly a highlight in 2011 was the successful launch of the Indian – French Megha Tropiques mission on 12 October. This mission will be a cornerstone in the GPM mission for the next decade.

## **Conclusion**

This document reports on the status of IPWG related matters which were discussed at CGMS-39. The relevance of continued validation activities is obvious. And new sensors will provide more data for the next decades.