CGMS-XXXI
WMO WP-14
Prepared by WMO
Agenda item: II/4

INTERNATIONAL PRECIPITATION WORKING GROUP

(Submitted by WMO)

Summary and purpose of document

To inform CGMS Members on the status of activity related to International Precipitation Working Group (IPWG).

ACTION PROPOSED

(1) CGMS Members to note the latest status of activity related to the International Precipitation Working Group (IPWG).

(2) CGMS Members to provide and update the inventory of routinely produced precipitation estimates; either operational or experimental/research, to the IPWG co-chairs.

(3) CGMS Members to note and support the upcoming IPWG science meeting.

Appendices: A. Terms of Reference for the International Precipitation Working Group (IPWG);

B. Precipitation algorithm template.

DISCUSSION

Background

1. CGMS-XXVIII initiated the establishment of an International Working Group on Precipitation, with co-sponsorship by WMO and CGMS.

2. CGMS-XXIX noted the successful organizational session of the International Precipitation Working Group (IPWG) and approved the terms of reference for the IPWG: provided in Appendix A of this document for completeness.

3. CGMS-XXX received with enthusiasm the report of the First International Precipitation Working Group (IPWG) Workshop that was held at the EUMETSAT Nowcasting Satellite Applications Facility (SAF) in Madrid, Spain, 23-27 September 2002. The workshop had very successfully promoted the exchange of scientific and operational information between the producers of precipitation measurements, the research community, and the user community, and developed pathways forward for a variety of activities within the IPWG.

(i) An important goal of the workshop was to compile an inventory of routinely produced precipitation estimates; either operational or experimental/research. Appendix B presents a template for CGMS Members to fill out and return to the co-chairs of the IPWG through the WMO satellite Activities Office.

(ii) Three working groups were established: Operational Applications, Research Activities, and Validation Activities. Each working group developed plans for future activities with short term, intermediate and long term goals.

(iii) CGMS-XXX supported the recommendations of the IPWG and developed action item 30.27

4. In response to CGMS-XXX Action Item 30.27 “CGMS members to provide an inventory of routinely produced precipitation estimates, either operational or experimental/research, to the IPWG co-chairs, Arnold Gruber and Vincenzo Levizzani”, a template for the response can be found on the IPWG web site.

5. For most of the algorithms, the information for the template (see next section) has been provided, although some of the sites have yet to provide a URL for users to view imagery and download data.

6. The action item remains open since some CGMS members need to address the portion of the template "including available web and ftp sites for imagery and data download."

7. CGMS Members that have provided algorithm information should check and update their input on a routine basis.

Activities of the IPWG since CGMS XXX

8. Since CGMS-XXX activity has taken place in three major areas: 1) Algorithms; 2) Research, and 3) Future Sensors and Other Open Items for Discussion. The major accomplishment in each area is presented in summary, followed by a more detail is subsequent paragraphs.

1. ***Algorithms****:*

(a) A central data and document database was organized and is maintained on the IPWG World Wide Web (WWW) site, which is maintained by Dr. Vincenzo Levizzani of CNR and IPWG Co-Chair:

http://www.isac.cnr.it/~ipwg (main IPWG site)
http://www.isac.cnr.it/~ipwg/algorithms/algorithms-invent.html (algorithm site)

(b) The current IPWG algorithm site (as of late September 2003) contains algorithm descriptions from seven infrared (IR)-only algorithms, two IR-based (with ancillary data) algorithms, four passive microwave (PMW)-only algorithms, and four blended PMW-IR algorithms. The algorithm name, responsible institution and contact person are presented below.

IR-based algorithms

Algorithm name	Institution	Developer/contact person
CMA	China Meteorological Agency (CMA), People Rep. of China	L. Naimeng
Convective-Stratiform Technique (CST)	NASA /GSFC, USA	A. J. Negri
EURAINSAT/A 1.0	EURAINSAT project, EU	F. J. Tapiador
High resolution Precipitation Index (HPI)	EUMETSAT, EU	T. Heinemann
JMAMSC	Japan Meteorological Agency, Japan	Nozomu Ohkawara
UOB Advection 1.0	Univ. of Birmingham, UK	C. Kidd
UOB NET 1.0	Univ. of Birmingham, UK	F. J. Tapiador

IR-based with ancillary data

Algorithm name	Institution	Developer/contact person
GOES Multispectral Rainfall Algorithm (GMSRA)	NOAA/NESDIS, USA	M.Ba and A. Gruber
Hydro-Estimator for short term (1-6 hr) Extreme Precipitation	NOAA/NESDIS, USA	R. Scofield

MW-based algorithms

Algorithm name	Institution	Developer/contact person
AMSU operational global rain rates	NOAA/NESDIS, USA	R. R. Ferraro
AMSU global monthly and pentad rainfall	NOAA/NESDIS, USA	R. R. Ferraro
SSM/I operational global rain rates	NOAA/NESDIS, USA	R. R. Ferraro
SSM/I global pentad and monthly rainfall	NOAA/NESDIS, USA	R. R. Ferraro

Blended MW-IR algorithms

Algorithm name	Institution	Developer/contact person
CPC Morhping technique (CMORPH)	NOAA, USA	Robert Joyce
EURAINSAT/B 1.0	EURAINSAT project, EU	C. Kidd
NRL Blended Satellite Technique	Naval Research Laboratory, USA	F. J. Turk
Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks (PERSIANN)	Univ. of Arizona, USA	Kuo-Lin Hsu

(c) IPWG website has descriptions and direct links to the developer website and/or data ftp site. Some of these algorithms work at the instantaneous scale, and others work at an accumulations scale (i.e., over a time interval and a fixed or variable spatial scale).

(i) At the first meeting, the group agreed that the instantaneous, single-sensor type algorithms (IR- and PMW-only) were presently the only techniques that are sufficiently well-enough developed such that their source code and/or related documents could be distributed on the IPWG website.

(ii) Currently, only the IR-only EURAINSAT/A 1.0 algorithm has its source code available for download to registered IPWG users, the rest of the algorithms have descriptions and points of contact (POC) to the developer.

(d) Items that yet need to be updated:

(i) Some PMW-only and blended-PMW/IR algorithm descriptions need to be updated on the IPWG website to document current and in-use algorithms. If any validation has been performed, this information should be provided as well.

(ii) Nearly all of the algorithms or techniques do not have any training materials posted. The training materials are to be posted at the IPWG website under "Training" which is available at (http://www.isac.cnr.it/~ipwg/training.html). The Virtual Laboratory for Satellite Data Utilization (VL) located at http://www.cira.colostate.edu/WMOVL has a link back to the IPWG website for training.

2. Research

(a) Case study data set for algorithm testing and comparison.

(i) At the Madrid meeting, the group suggested creating "case study" satellite datasets to be available through the IPWG website. This was meant to foster algorithm research and allow for testing of a technique to verify that it is working correctly. The group arbitrarily chose 21 March 2003 as a target data for data collection of the various PMW and IR datasets that go into (nearly all of) the PMW, IR or blended-type algorithms.

(ii) In retrospect, due to the manner in which most techniques operate, little advantage is expected from making such a database available.

(iii) Many datasets are available online in near real-time, and others have extensive online archives from which a user could order datasets.

(iv) The group recommends that for each type of satellite dataset, that information is posted on the IPWG website regarding the locations (web sites, ftp sites) where digital datasets could be downloaded. At the time of this writing (October 2003), the SSMI, TRMM-TMI/PR/VIRS, and AMSU-A/B datasets are all readily available online, but geostationary datasets are more difficult to obtain.

(v) Joe Turk agreed to be the point of contact for users that wish to obtain digital geostationary datasets, and agreed to update the IPWG website with information on obtaining the various PMW datasets mentioned above.

(b) Blended algorithms and techniques

(i) All of the components that go into a precipitation algorithm or the applications related to it are constantly being updated or are still being developed. This includes the development of blended techniques, satellite+NWP techniques, error characterization models, data assimilation, among others.

(ii) At the next IPWG meeting Joe Turk will report back to the group with a “status report” regarding the current state of the various blended-type algorithms and techniques.

(c) Climate applications

(i) Phil Arkin has provided a report entitled, “Climate Monitoring Principles and Requirements”, which outlines the current state of precipitation estimates from satellite as they relate to climate.

(ii) A meeting was held in mid-March at ECMWF entitled, “GEWEX-GPCP Workshop on Objective Analysis of Precipitation”. Topics were discussed relating to the improvement of the GPCP techniques as the climate community requirements push towards the need for shorter space and time scale products.

(iii) The meeting summary is posted on the IPWG website.

(iv) At the next IPWG, Bob Adler and Phil Arkin will report on the status of the new GPCP 1-degree daily products.

3. Future Sensors and Other Open Items for Discussion

(a) Frequency related issues:

(i) Dr Bizzarro Bizzarri has placed on the IPWG website a report related to spectrum protection for remote sensing in the microwave/sub-millimeter wavelength region. With the increasing encroachment by commercial applications interesting in exploiting some of the microwave bands, the need for frequency protection has never been greater.

(b) Southern Hemisphere coverage by GOES satellites

(i) Rapid scanning operation of the GOES satellites often restrict routine coverage for regions below 20S latitude to 3-hours

(ii) More routine coverage is needed for many algorithms to operate properly. The IPWG requests NOAA to address the issue of providing more frequent interval GOES coverage for use with precipitation estimates south of 20S latitude.

Plans for the Second International Precipitation Working Group (IPWG) Workshop

9. CGMS Members are requested to take note that the second International Precipitation Working Group Science meeting and workshop is to be held in Monterey, California, from October 24-28, 2004. A call for papers is forthcoming.

10. CGMS Members are requested to provide information to the IPWG Rapporteur on areas for future consideration by the IPWG and to provide guidance on novel research in this area and questions that might be addressed at IPWG II.

(a) Recalling the terms of reference for the IPWG: 1) Development of better measurements, and improvement of their utilization; 2) improvement of scientific understanding; and, 3) development of international partnerships.

(b) Areas might include THORPEX and similar experiments, information of Member activities in IPWG focus areas, guidance on studies related to uses of precipitation estimations in data assimilation and NWP on scales ranging from nowcasting to climate, reprocessing activities, and planned experiments such as the Global Precipitation Mission.

TERMS OF REFERENCE FOR THE INTERNATIONAL PRECIPITATION WORKING GROUP (IPWG)

Background

It was proposed at the first session of the IPWG (20-22 June 2001) to establish the International Precipitation Working Group (IPWG) as a permanent Working Group of the Coordination Group for Meteorological Satellites (CGMS). The IPWG will focus the scientific community on operational and research satellite based quantitative precipitation measurement issues and challenges. It will provide a forum for operational and research users of satellite precipitation measurements to exchange information on methods for measuring precipitation and the impact of space borne precipitation measurements in numerical weather and hydrometeorological prediction and climate studies.

Purpose

In the area of quantitative precipitation estimation, the IPWG intends to build upon the expertise of scientists who are currently involved in precipitation measurements from satellites with emphasis on derivation of products. The IPWG is established to foster the:

- Development of better measurements, and improvement of their utilization;
- Improvement of scientific understanding;
- Development of international partnerships.

Objectives

The objectives of the IPWG are:

(a) to promote standard operational procedures and common software for deriving precipitation measurements from satellites;

(b) to establish standards for validation and independent verification of precipitation measurements derived from satellite data; including:

- reference standards for the validation of precipitation for weather, hydrometeorological and climate applications;

- standard analysis techniques that quantify the uncertainty of ground-based measurements over relevant time and space scales needed by satellite products;

(c) to devise and implement regular procedures for the exchange of data on inter-comparisons of operational precipitation measurements from satellites;

(d) to stimulate increased international scientific research and development in this field and to establish routine means of exchanging scientific results and verification results;

(e) to make recommendations to national and international agencies regarding the utilization of current and future satellite instruments on both polar and geostationary platforms; and

(f) to encourage regular education and training activities with the goal of improving global utilization of remote sensing data for precipitation measurements.

Membership

The Working Group shall be comprised of representatives nominated by the satellite operators of the CGMS, other members of CGMS and relevant research satellite operators. The CGMS or the IPWG may invite other experts from the community to participate in the activities of the group.

Working Arrangements

The Working Group will be chaired by two Co-Chairmen appointed by the plenary of the CGMS. The Co-Chairmen shall compile a report on relevant activities for the scheduled plenary meetings of the CGMS. The interactive connection with satellite operators will be performed through the use of a Rapporteur who will attend and report to the CGMS meetings.

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

Algorithm template

Precipitation Algorithm Inventory Template (For routinely produced precipitation estimates)

Algorithm Description (Brief description including references & URL)	Spectral Intervals & applicable satellites	Spatial Scale	Temporal Scale	Ancillary Data (e.g., soundings)	Additional Comments