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Products and Software Working Group (PSWG) Draft Report 2012/03/26

Nathalie Selbach, Nigel Atkinson, Liam Gumley (co-chairs)

Introduction

The Satellite Sounder Science and Products working group was originally formed more than 10 years ago in order “to create a forum for scientific algorithms and products from operational and research weather satellites, and to promote scientific exchange among the international group of researchers and product developers.” For much of that time Tony Reale and Lydie Lavanant have been co-chairs, but both are now stepping down. The Group expressed its appreciation to Tony and Lydie for all their hard work. During that time much has changed, not least of which has been the increased availability of satellite information on the Internet. The original focus of the group on providing web resources is less relevant than it once was; therefore the first task was to define a new scope for the group:

1. Covers both Level 1 and Level 2 satellite products,
2. Software tools and packages for generating, analyzing, and visualizing products,
3. Enabling end users to obtain or generate the products they need,
4. End user feedback and training,
5. Exchange of information for validation of products,
6. Informing the user community about requirements for future missions,
7. Informing agencies about requirements of the users.

The group decided that a new name would be appropriate, to reflect the change in emphasis: **Products and Software Working Group**.

Liam Gumley, Nathalie Selbach and Nigel Atkinson were affirmed as new co-chairs.

Discussion topics were prompted by: (i) the ITSC co-chairs, (ii) matters arising from the Direct Broadcast Technical Sub-group, and (iii) matters raised by group members.

1. Web site

The SSSP web site remains a useful resource, but much of it is out of date. Some sections are no longer needed; others need updating. To facilitate this, group members need to have the ability to modify and create pages.

Action 1.1: Decide on a solution for working group user driven content and set up logins. This is needed because the group needs to add and edit content online without needing a web admin.

RayG and ScottM

Action 1.2: As part of the ITWG website redesign, the SSSP (now PSWG) web content should be reviewed for inactive or non-relevant links.

BillB

2. Availability of software packages and data

A large number of processing packages are now available for users to do their own processing of data, e.g. Direct Readout end-to-end processing of raw data to level 2 products. However, a few gaps have been. It would be helpful to list the available packages, together with contact information. This will allow gaps to be identified.

Action 2.1: Review currently available processing systems and software packages that can be obtained by the user community, and identify gaps. This is needed so that recommendations can be made to product and software development teams to add new features.

NigelA and AnnaB

IASI Level 2 processing is not currently available to users in the form of a software package, though it is the intention of CIMSS to provide this as part of CSPP. The group felt that the EUMETSAT IASI Level 2 software would benefit the community if it could be provided in software package form.

Recommendation: Request that EUMETSAT investigate the feasibility of releasing the official IASI Level 2 retrieval algorithm in software form. This is needed because IASI users would like to be able to run the software in real-time using direct broadcast data for nowcasting applications.

Action 2.2: ITWG to request that IASI Level 2 software be made available.
PSWG Co-Chairs

Action 2.3: Investigate how IASI Level 2 software could be made available.
DorotheeC

The IAPP software package developed at CIMSS is currently applied on an operational basis at several organisations around the world. One of them is the EUMETSAT's

Satellite Application Facility on Climate Monitoring using IAPP for the generation of ATOVS based environmental data records as well as for the processing of climate data records. CPTEC/INPE also currently applies IAPP and provides the retrievals to its users. In order to be able to continue the processing of these data sets using data from new satellites and sensors such as Metop-B and NPP and/or to deal with possible upcoming problems with existing sensors, updates of the retrieval algorithms or coefficients will be needed.

Recommendation: Request CIMSS to continue to support IAPP for POES processing, and to investigate whether it could be adapted for Metop-B, and also Suomi NPP.

Action 2.4: Send request to CIMSS for continued support for IAPP for Metop-B, and investigate feasibility of adapting it for Suomi NPP.
NathalieS

Recommendation: Request that GEOMETWATCH (GMW) clarifies its policy on data and software availability and licensing. This is needed so that the user community knows what to expect from GMW data in future.

Action 2.5: Forward request for information to GEOMETWATCH.
PSWG Co-Chairs

3. Issues affecting other ITWG Working Groups

It was noted that EUMETSAT had to modify the memory usage of RTTOV in order for it to run efficiently in the IASI L2 processor. Specifically, the handling of the IR emissivity atlas.

Recommendation: RTTOV team to investigate improving memory usage related to the IR emissivity atlas.

Action 3.1: Send technical details and examples of memory usage to RTTOV team.
TimH

Recommendation: CRTM to implement UWIREMIS database, similar to RTTOV.

Action 3.2: Request CRTM team to add UWIREMIS database support.
AllenH

4. Direct Broadcast reception

With the advent of NPP, Metop-B and FY-3, some existing stations (e.g. Brazil and Argentina, who contribute to RARS) will have to upgrade their equipment. Currently it is not easy to identify vendors.

Recommendation: Working group to assemble and disseminate information on vendors for DB antenna systems and contact information.

Action 4.1: Assemble a list of DB vendors, contact information, and capabilities.
LiamG

5. Product validation

Routine access to currently available validation datasets of collocated radiosonde, NWP soundings or active space-borne instruments with polar/geostationary satellite products as provided by operational agencies, for example NOAA, EUMETSAT, CIMSS, would provide users with important information to routinely validate and tune their respective scientific algorithms. Numerous cross validation datasets comparing specific products for existing operational and research satellite and ground sensors or during field campaigns also exist across the operational and research community and coordination is needed to identify suitable studies and give access to this information.

Recommendation: Review sources of information on validation data for satellite products and ensure links are available on Working group website.

Action 5.1: Review links on the validation section of the website and add any new sources of information.
LydieL

Recommendation: ITWG members should work with NOAA STAR Sounding validation team if they have temperature and moisture products they wish to validate.

Action 5.2: Provide contact information on the working group website for anyone who wishes to contact STAR validation team.
BominS

6. Level 1 format issues

Concern was expressed over the SDR (Sensor Data Record) content for the NPP instruments. For NOAA POES instruments (AMSU, MHS, HIRS, AVHRR), the “level 1b” format includes all the quantities directly measured by the instruments, including raw counts for earth views, space views and internal target views. This is of great benefit for scientists who may be studying the instrument characteristics in years to come, and provides traceability between measured quantities and the calibrated radiances. This is not the case for the NPP SDRs: no information on calibration view readings is available in the SDR; this is in principle contained in the RDR (Raw Data Record), but RDRs cannot be read by ordinary users. The Group considers it essential to provide this information in some form. As a work-around it may be possible for SSEC to provide a tool to export key information from the RDR into a more usable form, at least for ATMS.

Recommendation: ATMS, VIIRS, and CrIS SDR calibration traceability must be

improved to allow users to investigate detailed instrument performance.

Action 6.1: Investigate ways to expose or save calibration information from the RDR files.

RayG, NigelA

Action 6.2: In order to maintain a record of product provenance, create a set of guidelines for metadata to be associated with satellite products.

GeoffC

Another drawback with the SDR format is that it is not designed for efficient communication over limited bandwidths. For example, VIIRS geolocation files are very large, and for some channels the radiances are represented as floating point numbers that do not compress well. Scaled integers are generally preferred because they are smaller and the precision is well defined. Currently NOAA/CLASS does not provide a user option to compress the data prior to download. The group recognised the efforts being made by EUMETSAT to devise an improved VIIRS SDR format for use in EARS - and to provide a user tool to read and create the new format.

Recommendation: JPSS Project should investigate ways to streamline or improve data volume to reduce bandwidth needed for distribution. For example, request NOAA CLASS to apply internal HDF5 compression.

Action 6.3: Send request to JPSS Program Scientist for CLASS to offer optional internal HDF5 compression.

NigelA, LiamG

7. Infrared sounder FOV size

This is a scientific issue that is expected to be discussed in more detail by other Working Groups. Nevertheless, this Group has an interest in ensuring that results of scientific studies are collated and made available to decision makers. Decreasing the IR FOV size of sounders allows selection of more clear situations but has an impact in the amplification of the noise. Also, different technologies such as ‘intelligent’ pointing view (versus a fixed view) in a FOV or a matrix of detectors allow different processing approaches. Several studies have already been conducted by different teams (e.g. CNES, CIMSS, Meteo-France,..) to determine the scientific impact of these different techniques on NWP, climate and weather forecasting applications.

Action 7.1: Assemble the currently available studies on infrared sounder field of view size and write up a summary.

LydieL

8. Visualisation, analysis and development of software packages

A continuing action from previous ITSCs is to provide information on techniques and

software available to users to allow them to visualise and analyse satellite products. This field has evolved considerably in recent years, thanks to efforts by SSEC and others.

Action 8.1: Assemble a table of currently available software for visualization and analysis of satellite products, including version numbers, capabilities, sensors and formats supported, and download links.

NathalieS

Action 8.2: Create a Python cookbook for satellite products including Suomi NPP, EOS, POES, and Metop, in coordination with PyTroll developers.

RayG, GeoffC, GraemeM, ScottM

On the issue of package development, the “standard” practice of operational agencies contracting out software development to industry has been shown in many instances to be unhelpful to users. The industry code often has to be worked on extensively before it can be used by, for example, DB users.

Recommendation: Collect lessons learned from working with NPP/JPSS and GOES-R algorithms and provide to NOAA/JPSS.

Action 8.4: Write an “ADL Lessons Learned” document and submit to JPSS Program.

GraemeM, RayG

It was recognised that SSEC have gained much experience over the years in providing code to users that can be installed and run with a minimum of effort. It could be helpful to other groups (e.g. NWP SAF for AAPP and RTTOV, and Nowcasting SAF) if this experience was shared.

Action 8.5: Write a guide to “Compiling Portable Binary Code” and make available to ITWG online.

GraemeM, RayG

Similarly, other users are encouraged to share their software tools. The SSEC team is happy to assist in making contributed software more widely available, and the NWP SAF team is also keen to gather input from users.

Action 8.6: Advertise on ITWG website and associated software package websites that users can contribute their own algorithms or software for product generation.

KathyS

ITSC-18 Products and Software Working Group Participants

Name	Affiliation	Email Address
Liam Gumley	SSEC, UW	liam.gumley@ssec.wisc.edu
Nigel Atkinson	Met Office, UK	nigel.atkinson@metoffice.gov.uk
Anna Booton	Met Office, UK	anna.booton@metoffice.gov.uk
Simone Sievert	CPTEC INPE	simone.sievert@cptec.inpe.br
Pascale Roquet	MeteoFrance	pascale.roquet@meteo.fr
Dorothee Coppens	MeteoFrance	dorothee.coppens@meteo.fr
Jörg Ackermann	EUMETSAT	joerg.ackermann@eumetsat.int
Tim Hultberg	EUMETSAT	tim.hultberg@eumetsat.int
Bomin Sun	NOAA	bomin.sun@noaa.gov
Kathy Strabala	SSEC, UW	kathy.strabala@ssec.wisc.edu
Graeme Martin	SSEC, UW	graeme.martin@ssec.wisc.edu
Ray García	SSEC, UW	ray.garcia@ssec.wisc.edu
Geoff Cureton	SSEC, UW	geoff.cureton@ssec.wisc.edu
Scott Mindock	SSEC, UW	scott.mindock@ssec.wisc.edu
Lydie Lavanant	MeteoFrance	lydie.lavanant@meteo.fr
Nathalie Selbach	DWD	nathalie.selbach@dwd.de
Katja Hungershofer	DWD	katja.hungershoefer@dwd.de
Allen Huang	SSEC, UW	allen.huang@ssec.wisc.edu
Could not attend		
Christelle Ponsard	EUMETSAT	christelle.ponsard@eumetsat.int