

2.6 PRODUCTS AND SOFTWARE

Web site: <http://cimss.ssec.wisc.edu/itwg/sssp/index.html>

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2.6.1 Introduction

The scope of the Products and Software working Group has been re-defined during its meeting at the ITSC-18 and covers the following topics:

1. 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, and
7. Informing agencies about requirements of the users.

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.

2.6.2 Topics Assigned by the ITWG Co-Chairs

New Data

(Meteor-M, FY3C, Metop-B, S-NPP, Meghatropiques, commercial launches e.g. GIFTS/STORM, Iridium)

The group noted that CMA released FY-3C DB Level 1 software on March 27, 2014.

Action PSWG-1

Nigel Atkinson and Liam Gumley to test the FY-3C software and report back to the PSWG members

The group noted that the Meteor-M N2 launch is scheduled for June 2014.

Recommendation PSWG-1 to Roshydromet

- 3) Provide real-time DB data and DB processing software.**
- 4) Provide global data via a web portal.**

The group noted that some satellite agencies still use binary data formats.

Recommendation PSWG-2 to satellite agencies

- 3) Data format documentation and/or software APIs should be made available early for new datasets.**
- 4) Portable self-describing data formats should be used where possible. CF-compliant formatting and metadata should be used where possible.**

The group noted that NASA is preparing to design new algorithms, software, and data formats for Level 0 to Level 1B processing of VIIRS, CrIS, and ATMS. This has the potential to introduce confusion in the user community.

Recommendation PSWG-3 to NASA and JPSS

Provide information to the community on algorithm, software, LUT, and format changes, and comparisons between IDPS and NASA radiance products.

Real Time Data Dissemination:

RARS, Software Packages for Direct Broadcast

The group noted that GCOM-W1 has a direct broadcast capability. It would be helpful for the DB community to:

- (a) have continuous access to GCOM-W1 AMSR2 data via DB to provide continuation of AMSR-E capability, and
- (b) have access to software for processing the AMSR2 DB data.

Recommendation PSWG-4 to JAXA

Provide routine DB data and processing software for GCOM-W1 AMSR2.

The group noted that satellite operating agencies need to be reminded of the value of providing unrestricted DB access and software.

Recommendation PSWG-5 to satellite agencies

Continue to provide routine global unencrypted DB capability and accompanying processing software for both existing and new systems and sensors.

The group noted and supported the recent formation of the SSEC CSPP GEO project.

Recommendation PSWG-6 to SSEC

Create product generation software for GEO sensors including ABI, AHI, AMI via common algorithms.

The group noted a desire to create a climate data record of sounding products dating back to TOVS (prior to ATOVS). This was also raised in the Climate WG.

The group noted the development of the NOAA DB real-time network (DBRTN) by SSEC.

Recommendation PSWG-7 to NOAA and EUMETSAT

NOAA and EUMETSAT should work together to make the DBRTN data available to the global community (e.g., via RARS and/or GTS).

User Notification:

Best-practices for Advanced Information of Changes, Detection and Reaction to Data Problems

The group expressed a desire for better dissemination of sensor and data processing status.

Recommendation PSWG-8 to satellite agencies

Create online satellite, sensor, and processing status sites using the [POES status page](#) as a model, providing searchable archives of status information, with key

events (e.g., satellite/sensor failures, noise level out of specification, etc.) clearly separated from routine events, and contact information provided.

Future Dissemination of Hyperspectral IR Data:

Lossy Data Compression and Implications, Two-level Dissemination Concepts, Timeliness and Reliability Requirements

Regarding the dissemination of PCs and residuals the group noted that it may be better to distribute the remaining PCs. While not directly relevant to the PSWG, this topic could be investigated by another WG and/or a technical subgroup. The topic of strategy of updates for training data was also raised in the same context.

The group noted that JPSS is considering increasing the DB data rate from 15 to 30 Mbps for satellites after and including JPSS-2.

The group noted that SNPP CrIS will switch to full spectral resolution in Q4 2014. CSPP is already set to handle the FSR data (by transforming to reduced spectral resolution). NOAA has almost finished the new version of CrIS FSR calibration software and it is expected to be available in CSPP within a reasonable time after the FSR switchover.

Efficient Use of Hyperspectral IR Data:

Assimilation of PCs/Reconstructed Radiances, PCs and CDRs, PC RT Models, Level 2 Products

The group noted there are several SW packages available that utilize IASI/CrIS/AIRS for creating level 2 products. A list of software packages has been generated resulting from an action at ITSC-18 and will be made available via the PSWG software.

The group noted that the EUMETSAT Level 2 product utilizes reconstructed radiances.

Use of Sounding data in Cloudy Regions:

Accuracy of Cloudy RT in MW and IR, Assimilation/Retrieval Strategies

The group noted that EUMETSAT, NUCAPS, MIRS, and HSRTV products all include cloudy and clear retrievals.

The group noted that a cloud cleared retrieval scheme is not available in IAPP.

Validation:

Sharing and Joint Analysis of Results During Cal/Val Phase, Validation Datasets, Field Campaigns, NWP Monitoring and Assimilation, Absolute Calibration, Intercalibration

The group noted that users of DB software and products need information on the quality of the products.

Recommendation PSWG-9 to software and product providers (Met Office, SSEC)

Provide information on the quality and evaluation of their respective products to users.

Visualization Packages for Sounder Data

The group created a list of visualization packages as a result of an action from ITSC-18. The group has a requirement to keep the list up to date.

Action PSWG-2

Nigel Atkinson and Nathalie Selbach to review the visualization package list on the PSWG webpage periodically.

Infrared FOV Size: Trade-off Versus Other Characteristics

The group recommended that the Advanced Sounder working group be responsible for all work on this topic.

Case Studies to Further Improve Algorithms For Retrievals and Data Assimilation (Cloud Clearing, Surface Emissivity, Water Vapour, Other Trace Gases)

The group noted that surface emissivity validation should be explored further.

Action PSWG-3

Thomas August to assemble a list of available surface emissivity validation datasets.

2.6.3 Other Topics

The group noted that KMA is willing to provide algorithms for the CSPP GEO processing software package.

Action PSWG-4

Graeme Martin to contact KMA and explore the mechanism for transferring algorithms to CSPP GEO.

The group noted that the KMA AMI may have a DB transmission and therefore a community of DB users who may need processing software and products.

Recommendation PSWG-10 to KMA

Provide DB data and processing software for AMI.

The group noted that NOAA STAR is collecting validation data from a number of sources relevant to temperature and moisture soundings. The data are all available from the NOAA Satellite Products Validation system website (<http://www.star.nesdis.noaa.gov/smcd/opdb/nprovs/index.php>). The group recommends that product users consult this website and use the data for product validation. The NPROVS+ team invites colleagues to send them their temperature and water vapor retrieval EDRs for inter-comparison with many other products that are routinely accessed and evaluated by the team.

The group noted that a continued funding support of DB packages is needed and agencies should be made aware that the need for such support has not gone away.

Recommendation PSWG-11 to NASA, NOAA, and EUMETSAT

Continue support for funding of DB software packages.

The group noted that there is still a desire to have IAPP supported and available.

Action PSWG-5

Liam Gumley to convey to SSEC the need to come up with a plan for continued IAPP support, perhaps under the umbrella of CSPP.

The group noted the following items related to EPS-SG:

1. Data format will be netCDF.
2. EUMETSAT desire for information on lessons learned from ATMS striping, including impact on higher level products. Any information should be sent to Jörg Ackermann.
3. IASI-NG and microwave sounder will not be synchronized. Remapping will be required for some applications. PSWG recommends that anyone who is concerned about this should contact Jörg Ackermann at EUMETSAT.

The group recommends that DB software providers ensure that any ancillary data required to operate the software is available in a convenient, accessible, and no cost form.

The group noted the importance of reprocessing whenever there is a major update to a product retrieval algorithm, e.g., EUMETSAT IASI L2 product. Data providers are encouraged to create consistent data records for the community, for instance for climate and scientific applications.

2.6.4 GMS High Level Priority Plan

The group agreed to circulate the CGMS HLPP and provide comments and feedback in time for the final version of the PSWG report from ITSC-19.

2.6.5 Topics and Actions from ITSC-18

The following section gives an overview on the status of the actions from the PSWG group since ITSC-18. The open actions will be followed up until ITSC-20.

Open Actions

This section gives an overview of the actions from ITSC-18 having the status “open” at the time of writing of the ITWG report.

Website

Action PSWG-1 (ITSC-18)

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.

Status: Open

Bill Bellon and Leanne Avila are considering a redesign of the whole ITWG web site, using a Content Management System. Other possibilities discussed were:

File sharing service (e.g., Dropbox)

User-driven forum (e.g., phpBB)

User-driven groups (e.g., Plone)

The PSWG will wait until a new CMS and website is selected, and then redesign the PSWG area of the site.

Product Validation

Recommendation PSWG-7 (ITSC-18)

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

Action PSWG-11 (ITSC-18)

Review links on the validation section of the website and add any new sources of information.

Status: Open

Dependent on web site redesign (PSWG-1 from ITSC-18)

Level 1 Format Issues

Recommendation PSWG-9 (ITSC-18)

ATMS, VIIRS, and CrIS SDR calibration traceability must be improved to allow users to investigate detailed instrument performance.

Action PSWG-14 (ITSC-18)

In order to maintain a record of product provenance, create a set of guidelines for metadata to be associated with satellite products (Geoff Cureton).

Status: Open

Nathalie Selbach and Geoff Cureton are assigned to this action.

Development of Software Packages

Recommendation PSWG-11 (ITSC-18)

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

Action PSWG-19 (ITSC-18)

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

Status: Open (Graeme Martin, Ray Garcia)

Graeme Martin to write up lessons learned and recommendations in a short document as soon as possible and distribute it to the group.

Action PSWG-20 (ITSC-18)

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

Status: Open (Graeme Martin, Ray Garcia)

To be written up by Graeme Martin as soon as possible.

Action PSWG-21 (ITSC-18)

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

Status: Open (Kathy Strabala)

Kathy Strabala will add information on CSPP and IMAPP websites, and the new ITWG website.

Closed Actions

This section summarizes the outcome of the actions of the Products and Software Working Group from ITSC-18, which have been closed at the time of writing of the report for ITSC-19.

Action PSWG-2 (ITSC-18)

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

Status: Closed

The group decided that the group will start with a clean slate when the new CMS and website is ready, and will focus on providing high level links only. The group noted that Google search is more likely to provide good links than a set of static links.

Software

Action PSWG-3 (ITSC-18)

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.

Status: Closed

The Co-Chairs have produced an html document showing:

- Direct broadcast packages,
- Level 1 packages,
- Level 2 packages, and
- Visualisation and analysis tools.

This document will be made available on the new web site, and circulated to the WG members.

Recommendation PSWG-1 (ITSC-18)

Request that EUMETSAT investigates the feasibility of releasing the official IASI Level 2 retrieval algorithm in software form.

Action PSWG-4 (ITSC-18)

ITWG to request that IASI Level 2 software be made available.

Action PSWG-5 (ITSC-18)

Investigate how IASI Level 2 software could be made available.

Status: Closed

EUMETSAT reported that they are not able to release the package (D. Coppens). Since ITSC-18, other packages have been made available, or are planned:

- 1 UW's "CrIS, AIRS and IASI Hyperspectral Retrieval Software" (v1.2 of the CrIS/AIRS/IASI dual-regression retrieval software released Sep 2013)
- 2 NOAA's MIRS software released as part of CSPP March 2014 (Sid Boukabara) supporting ATMS, AMSU, MHS.
- 3 Chris Barnet is working with the CSPP project at UW to release the NUCAPS software package to the DB community. NUCAPS includes support for SNPP CrIS/ATMS, Metop IASI/AMSU/MHS, and Aqua AIRS/AMSU retrievals; planned for release in mid 2014.

Action PSWG-6 (ITSC-18)

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

Status: Closed

Request was sent to CIMSS and a reply received from Tom Achtor: CIMSS is continuing to support IAPP. CIMSS does not have the resources to adapt IAPP for ATMS/CrIS, but other temperature/moisture retrieval algorithms will be included in CSPP (see PSWG-4/PSWG-5 from ITSC-18). Also, see ITSC-19 poster 8p.06 by Szuchia Moeller.

The CSPP project will look into including IAPP under the CSPP umbrella.

Availability of Data

Recommendation PSWG-3 (ITSC-18)

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 PSWG-7 (ITSC-18)

Forward request for information to GEOMETWATCH.

Status: Closed

Since ITSC-18 there have been various high-level discussions between EUMETSAT, NOAA, SSEC and others on the subject. (Direct request from PSWG not considered necessary). SSEC assessment at the present time is that: while high level discussions between GMW and potential STORM users have occurred and are ongoing, it is expected that (a) all users of STORM data will need to pay for the data, and (b) the processing software is likely to be restricted proprietary information.

Issues Affecting Other ITWG Working Groups

Recommendation PSWG-4 (ITSC-18)

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

Action PSWG-8 (ITSC-18)

Send technical details and examples of memory usage to RTTOV team.

Status: Closed

The information was sent to the RTTOV team. James Hocking will look at implementation for RTTOV v11. Updates to the IR land surface emissivity atlas to improve speed and memory usage have been implemented in RTTOVv11.

Recommendation PSWG-5 (ITSC-18)

CRTM to implement UWIREMIS database, as has been done for RTTOV

Action PSWG-9 (ITSC-18)

Request CRTM team to add UWIREMIS database support (Allen Huang).

Status: Closed

This is now available in CRTM.

Direct Broadcast Reception

Recommendation PSWG-6 (ITSC-18)

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

Action PSWG-10 (ITSC-18)

Assemble a list of DB vendors, contact information, and capabilities (Liam Gumley)

Status: Closed

A list has been created and will be published on the new web site.

Recommendation PSWG-8 (ITSC-18)

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

Action PSWG-12 (ITSC-18)

Provide NOAA contact on the PSWG web site.

Status: Closed

Information on contact person has been provided by Bomin Sun. The NOAA Satellite Products Validation system website is:

<http://www.star.nesdis.noaa.gov/smcd/opdb/nprovs/index.php>. A list of persons involved in the project can be found at <http://www.star.nesdis.noaa.gov/smcd/opdb/nprovs/personnel.php>

Recommendation PSWG-9 (ITSC-18)

ATMS, VIIRS, and CrIS SDR calibration traceability must be improved to allow users to investigate detailed instrument performance.

Action PSWG-13 (ITSC-18)

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

Status: Closed

ATMS raw counts can be extracted from the “verified RDR,” which can be generated by CSPP. A note has been prepared for the PSWG web site (Details can be provided by Nigel Atkinson).

Recommendation PSWG-10 (ITSC-18)

JPSS Project should investigate ways to streamline or improve data volume to reduce bandwidth needed for distribution.

Action PSWG-15 (ITSC-18)

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

Status: Closed

- The EUMETSAT Compressed VIIRS format is now mature, and gives a 6-fold reduction compared with the original VIIRS SDR. Java conversion tool is available. The format could be adopted more widely.
- The NOAA/NESDIS IDPS is implementing gzip internal compression for SNPP HDF5 files. It will be a user-selectable option at download time from CLASS. For VIIRS SDR files (the largest files) the compression is expected to reduce data volumes by more than 50%.
- gzip internal compression is an option in CSPP, or the user can add it using ‘h5repack’.

Infrared Sounder FOV Size

Action PSWG-16

Assemble the currently available studies on infrared sounder field of view size and write up a summary (Lydie Lavanant).

Status: Closed

This topic has been reassigned to the Advanced Sounder Working Group (Dave Tobin).

Visualisation and Analysis

Action PSWG-17 (ITSC-18)

Assemble a table of currently available software for visualization and analysis of satellite products.

Status: Closed

Co-Chairs have produced a table for inclusion on the PSWG web pages (see also Action PSWG-3 from ITSC-18). The list also includes links to WMO and NASA resources.

Action PSWG-18 (ITSC-18)

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

Status: Closed

Geoff Cureton has created a cookbook for handling the output of the CSPP VIIRS EDR. This will be made available via the PSWG web pages.