

2.6 PRODUCTS AND SOFTWARE

Web site: <http://cimss.ssec.wisc.edu/itwg/pswg>

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2.6.1 Introduction

The following topics were discussed in the meeting held 1st November 2015:

1. CGMS High Level Priority Plan (HLPP) – achievements since ITSC-19 and future work. Specific topics were suggested by the ITSC co-chairs;
2. Review of PSWG Action items from previous ITSCs; and
3. Other items.

2.6.2 High Level Priority Plan items suggested by ITWG co-chairs

References to specific paragraphs from the HLPP are given below in bold and italics.

CGMS 1.1.3 Facilitate the evolution of research short-term missions to an operational status

It was noted that Tom Pagano (JPL) has been funded by NASA for a technology demonstration of hyperspectral sounding on small satellites (CubeSat Infrared Atmospheric Sounder or CIRAS).

Recommendation PSWG-1 to NASA

NASA is encouraged to share products of the CIRAS demonstration project with appropriate science teams (e.g., CrIS, IASI, NWP centres) for evaluation.

It was noted that Canada and Russia have plans for imaging missions in high elliptical orbits. To be considered when details are known.

The following recommendation is generally relevant to section 1.1 of the HLPP on Coordination of observing systems, facilitating rapid progress in implementing new data:

Recommendation PSWG-2 to satellite agencies

Agencies to release details of instrument characteristics (e.g. channel definitions and data formats) well in advance of launch.

CGMS 1.4.1 Evaluate standards for dissemination mechanisms

Dissemination methods are discussed in the DBNet Guide:

Action PSWG-1

PSWG members to review the “Guide To The Direct Broadcast Network (DBNet)” by 30 November 2015

CGMS 1.4.2 Facilitate the transition to new direct readout systems (GOES-R, JPSS, FY-3, Meteor-M)

Achievement: The group welcomed the release by CMA of Level 0 and Level 1 processing software for FY-3C, and the collaborative FY-3C evaluation project. The group also welcomed the initiative to evaluate MTVZA-GY microwave imager data and proposals for routine distribution of the global data.

There was a desire for Level 2 products from FY-3 (including imager products such as fire detection). UW has software for MERIS True Colour, available on request but not yet publicly released. This could be considered for future public release.

Recommendation PSWG-3 to Roshydromet

Roshydromet are encouraged to release a direct broadcast processing package for the Meteor-M N2 series, including level 1 processing for the MTVZA-GY microwave imager.

A document giving a list of level 0, level 1 and level 2 software packages has recently been made available on the PSWG Web site; it is currently at http://cimss.ssec.wisc.edu/itwg/pswg/software_packages.html

Action PSWG-2

PSWG members to review the list of software packages in the document linked from the PSWG web site and send corrections or additions to the co-chairs.

CGMS 1.4.3 Work together to define a set of recommendations seeking affordable future receiving stations or alternatives to direct read-out solutions

Recommendation PSWG-4 to satellite agencies

Agencies are encouraged to make future missions compatible with existing ground stations for direct broadcast, e.g. with regard to data rate, frequencies, polarisation, encoding etc., so that station operators do not have to buy new hardware (where possible) to support new satellite missions.

The group also noted initiatives such as use of GEANT by EUMETSAT, and the Himawari Cloud data distribution (accessible to national weather centres).

Recommendation PSWG-5 to satellite agencies

Agencies to consider “cloud” data delivery methods, where appropriate, as an alternative to direct readout for providing real-time data.

CGMS 1.4.4 Provide level-1 processing software packages, consistent with global processing software, for processing of Direct Broadcast data from the new generation of LEO satellites

The group considers that this is being addressed satisfactorily. It was noted that a Level 1 package for Metop Scatterometer winds is being considered by EUMETSAT for release in 2016. Landsat and Sentinel-2 were mentioned, but considered out of scope for this group.

Plans are progressing for DB software for EPS-SG instruments, based on global processing software.

CGMS 1.4.5 Further enhance the Regional ATOVS Retransmission Services (RARS) initiatives through inclusion of the NOAA Direct Broadcast Real Time Network (DBRTN) and an extension to advanced sounders for at least half of the globe.

This is being addressed through the DBNet Coordination Group. The DBRTN data are not yet being widely distributed, but this should happen once a connection to EUMETSAT has been set up.

Recommendation PSWG-6 to NOAA and DBNet project

Consider ways for DBRTN and hyperspectral sounder data to be made available via rebroadcast services in the Asia-Pacific region.

The following recommendation is not related to a specific HLPP item, but is generally relevant to section 1.4 on Regional Retransmission Services, noting that the user base for such services may be wider than just NWP:

Recommendation PSWG-7 to satellite agencies

Retransmission services are encouraged to consider broadening the scope to include imager products, level 2 products and full hyperspectral content.

CGMS 2.1 Support the user-provider dialogue on regional/continental scales through regional coordination groups

This is addressed through groups such as GODEX-NWP (formerly NAEDEX/APSDEU). No specific recommendation.

CGMS 2.3 Increase access to, and use of, data from R&D and pre-operational missions

The group strongly appreciates the efforts of NASA, JAXA, etc. in making data from non-operational missions available in near real time. For example: Rapidscat, Aqua, Terra, GPM. It was noted that GCOM-W1 provides DB over some parts of the globe (e.g., it has been received at SSEC). Wider coverage may be possible; potential users would need to liaise with JAXA to obtain the necessary agreements.

Recommendation PSWG-8 to JAXA

JAXA to consider providing more geographical coverage for GCOM-W1 DB, and the release of level 1 software for AMSR2 to those receiving the DB.

CGMS 2.6 Develop efficient standardized data handling for high-resolution imaging and hyper-spectral instruments

Achievement: The group appreciates the efforts of EUMETSAT in devising the CVIIRS format for VIIRS SDR data, and enabling the inclusion of this data in the EARS system. Principal Component scores are included in EARS-IASI, but are not routinely used for CrIS. NOAA would look into it if there was a user requirement, but so far no requests have been received.

The group noted that PC scores are the baseline dissemination format for MTG-IRS and that a standardised method of handling this data is desirable.

Recommendation PSWG-9 to EUMETSAT

The PSWG supports the NWP SAF proposal to create a processing package for MTG-IRS (called IRSP) that handles the PC compression aspects (e.g. creating reconstructed radiances).

CGMS 3.2.5 To establish together with the user community a commonly agreed approach for retrieval of Principal Component scores and associated parameters from hyperspectral infrared data

The issue of whether to use global or regional eigenvectors was noted. No firm conclusions were reached.

CGMS 3. Enhance the quality of satellite-derived data and products

Additional topic: There is a need for more instrumented validation sites for satellite sounder data, in particular at lakes such as Lake Titicaca (Peru) and Lake Quinghai (China), which are already used for satellite monitoring, but are not instrumented.

Recommendation PSWG-10 to satellite agencies

Agencies are encouraged to develop instrumented ground sites for validation.

It was noted that Direct Broadcast can provide a vital role in supporting field campaigns, because of the excellent timeliness of the data.

CGMS 3.3.3 Conduct an intercomparison study between the different methods to derive level 2 data from infrared hyperspectral sounders

Achievement: A comparison of HSRTV and NUCAPS has been presented at ITSC-20 by Elisabeth Weisz, which included a description of the differences and similarities of the two systems. Follow-on studies are planned in the context of a visiting scientist mission by Nadia Smith, at EUMETSAT.

NASA is also planning a comparison, for AIRS and CrIS. It would be desirable to add IASI, and also to look at IAPP and MIRS for the microwave.

Recommendation PSWG-11 to participants in level 2 comparison studies

Results of level 2 comparison studies should be published in the open literature and also presented at ITSC-21.

CGMS 3.5.1 Establish a common vocabulary and methodology with appropriate error propagation to include the errors associated with validation data (e.g. radiosonde temperature, water vapour, precipitation and winds)

Some work has been done on this in the context of FIDUCEO:

Action PSWG-3

Martin Burgdorf to circulate the sections of the FIDUCEO framework doc that address errors associated with validation data as soon as they have been completed.

CGMS 3.5.3 Agree on standardized procedures to derive NedT estimates for microwave sounders, and include such estimates in the disseminated BUFR data

An action has been taken by the NWP group to look into this.

In addition, Nigel Atkinson has produced a document on NedT calculation. The document compares several existing methods. It would be useful also to include the Allan Variance method described in Fuzhong Weng's talk.

Action PSWG-4

Nigel Atkinson to circulate his Technical Memorandum on NedT to the PSWG group, and to the co-chairs of NWP group.

Regarding encoding into BUFR, Nigel reported that two methods are currently in use: in the first an NedT descriptor is included in the BUFR sequence (implemented for ATMS); in the second (applicable to existing BUFR sequences), back references are given to the standard deviation of the brightness temperatures. It is planned to include this as an option in the next update release of AAPP, for AMSU, MHS and HIRS.

Action PSWG-5

Action: Nigel Atkinson to inform PSWG when samples of AMSU/MHS/HIRS BUFR files with NedT encoding are available, in order to check whether they can be decoded okay.

CGMS 3.6.1 Establish a sustained interaction with the operational Nowcasting communities with a view to fully utilise the commonality of the future geostationary imagers and sounders

The group recognised that this is an important topic, but there were no specific recommendations.

CGMS 3.6.2 Report on the progress within the Nowcasting community toward the use of hyperspectral sounders and work toward common products to serve the requirements of the global community

DWD reported that their forecasters make use of IASI L2 products. Their main complaint is the poor timeliness of global data: in the future it is planned to use EARS data.

Products are also provided via AWIPS to Alaska. There are initiatives for other weather services to evaluate the products. Ralf Peterson (UW) is active in this area.

Temperature and humidity are the most important products. Chris Barnet reported that the NCEP forecasters like to derive their own stability indices, because they often modify boundary layer profiles. On the other hand, other centres (e.g., Poland) make use of the supplied stability index products.

It was noted that there is no standard method of computing CAPE (convective available potential energy).

Training is very important in the use of hyperspectral sounders in nowcasting. It was noted that the International Precipitation Working Group (IPWG) does training in the precipitation products.

Recommendation PSWG-12 to ITWG co-chairs

Consider whether there is an unmet requirement for training on the applications of hyperspectral sounder products, and, if so, whether ITWG should provide a short course.

CGMS 3.8.1 Conduct studies to trade off benefits of spectral, radiometric, and spatial resolutions of infrared sounders

CGMS 3.8.2 Conduct studies to investigate the technical feasibility to reduce the field of view sizes for future microwave sounders

These are being looked at by the Advanced Sounders Working Group. No specific recommendation.

CGMS 4.2.1 Continue to foster optimum use of satellite data for weather forecasting, climate applications, and environmental assessments including hazardous events

Achievements: CSPP workshops and CM SAF yearly workshops. The next CM SAF workshop will take place at ECMWF in Reading, UK, in mid-November 2016. The focus of the workshop will be the applications of satellite-based data sets (mainly from the CM SAF) in numerical modeling.

There is a JPSS-funded initiative for training in flooding, fire, smoke and sounding products: the Proving Ground initiative.

EUMETSAT are planning training activities in preparation for MTG.

The group commended the WMO/CGMS Virtual Laboratory for Training and Education in Satellite Meteorology (VLab) and noted that there is an event week coming up on “Preparing for the Next Generation of Satellites” (16-20 November). See <http://www.wmo-sat.info/vlab/next-generation-of-satellites/>

Recommendation PSWG-13 to ITWG members

ITWG members work with VLab to promote training activities related to satellite data.

It was suggested that GPU programming is likely to become more widely used in the next 10 years, and training may be needed for this. However, there is no specific recommendation at present.

2.6.2 Review of PSWG Actions, and Recommendations from previous ITSCs

- ITSC19-PSWG-3: on Validation Datasets: Thomas August confirmed that this is being taken forward by the RT Working Group. **PSWG Action closed.**
- ITSC19-PSWG-4: Graeme Martin to contact KMA and explore the mechanism for transferring algorithms to CSPP GEO. Contact has been made and a way forward has been identified. **Action closed.**

Action PSWG-6

Graeme Martin to implement in CSPP GEO the algorithms to be made available by KMA.

- ITSC19-PSWG-5: on IAPP: The group expressed their appreciation of SSEC in providing a home for IAPP, ensuring that the capability to process older instruments is maintained. The CM SAF relies heavily on IAPP. It was noted that IAPP is currently not working for Metop-A because of the failed AMSU channel 8.

Action PSWG-7

SSEC to modify IAPP so that it does not rely on Metop-A AMSU channel 8, and also to look at implementing improved bias correction (see poster by Szuchia Moeller).

- ITSC18-PSWG-14: on Metadata: Although this action is several years old, Geoff Cureton noted that there had been developments in the last 12 months. **Action remains open** and Geoff will distribute a document soon.
- ITSC18-PSWG-19: on ADL lessons learnt: Graeme pointed out that although the audience for lessons on ADL is limited, there may be useful general statements about porting global software to DB applications. **Action remains open** and Graeme will write and distribute a document in the next 6 months.
- ITSC18-PSWG-20: Guide to compiling portable binary code: A document is available and Ray will circulate to the group for comment. **Action remains open but expect to close soon.**
- Recommendation ITSC19-PSWG-3: *Provide information on algorithm, software, LUT, and format changes, and comparisons between IDPS SDR and NASA L1B radiance products.* Liam Gumley reported that NASA has defined their version of the VIIRS L1B format and it is available at SSEC. The CrIS L1B format has also been defined; there are some differences with the IDPS SDR product; comparisons will be done in the next 6 months. For ATMS, Bjorn Lambrigsten is the lead. The emphasis for these NASA products is to provide climate quality. NOAA is not planning to change to the NASA L1 products, therefore NWP users are not affected. Also, CLASS will continue to archive the NOAA SDR products. In some cases, SDR re-processing will be done by NOAA.

2.6.3 Other items

Katerina Melnik asked whether it would be possible to provide a VIIRS/MODIS flooding product in CSPP. An internal product exists, but is not yet released.

Recommendation PSWG-14 to JPSS

Support development of VIIRS flood product as part of CSPP.

It was noted that a polar winds processor had been proposed in the DB Technical subgroup, and subsequent discussions confirmed that the processor developed by Jeff Key would be a suitable candidate for implementation in CSPP.

Recommendation PSWG-15 to JPSS

Support implementation of a polar winds product as part of CSPP.

Pascal Brunel conveyed a request from the NWP Group for VIIRS cluster analysis to be included in the CrIS SDR, in the same way as an AVHRR cluster analysis is included in IASI 1c. So, for a number of clusters (up to 7 for IASI) we would have the mean and standard deviation of the VIIRS radiance for selected channels. This is not a cloud analysis: it allows NWP centres to derive information on the uniformity of the CrIS footprint.

It was pointed out that VIIRS and CrIS are processed independently in the IDPS, and granules are not in time order. Consequently, if such a scheme were implemented in the global data there would be some degradation in timeliness, as the CrIS processing would have to wait for VIIRS. This is less of an issue for DB.

Recommendation PSWG-16 to NOAA

Investigate the feasibility of providing a VIIRS cluster analysis in the CrIS footprint, including timeliness implications.

GOES-R data distribution was discussed. While plans for distributing data via GRB are well documented, information on other data distribution channels such as NOAAPort, GEONETCast, and terrestrial networks would help users to plan for GOES-R.

Recommendation PSWG-17 to NOAA

Clarify plans for distributing GOES-R data to users via mechanisms other than GRB.

A recommendation was brought by Nick Bearson after the meeting. It is based on recent requests from international GOES-R users and is intended to facilitate use of those observations as soon as they are received, and to allow users to capture and process a localized subset of the larger observation set. With the current GOES-R system design, users have to wait for the full image to be received (up to 15 minutes for a full disk) before any geolocation data are available.

Recommendation PSWG-18 to satellite agencies and DB system designers

Include geolocation information before or alongside the associated instrument observations in the data stream, in order to allow timely image generation for regional subsets.