

## 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 Products and Software group meeting held on 3rd December 2017 at ITSC-21:

- Review of PSWG Action Items and Recommendations from ITSC-20;
- Specific topics suggested by the ITSC Co-Chairs;
- Items for software developers (AAPP/OPS-LRS, CSPP, etc...); and
- CGMS High Level Priority Plan (HLPP) and CGMS-45 actions.

### 2.6.2 Review of PSWG Action Items and Recommendations from ITSC-20

Action PSWG20-2 to review the list of software packages on the PSWG website. The action was closed as the list has been reviewed. However, a new action is needed to review the list again, and make sure any other outdated software package information is removed.

#### Action PSWG-1

**Nigel Atkinson and Nathalie Selbach to update the list of software packages on the PSWG web page by May 2018.**

Action PSWG20-3 on FIDUCEO Framework Document. Nigel Atkinson will ask Martin Burgdorf whether this document is still to be considered for distribution. If not, the action can be closed.

Action PSWG20-6 on GEO-KOMPSAT-2A algorithms. The GEO-KOMPSAT-2A satellite will have an imager similar to ABI and will be at 128°E. The Level 1 data will be transmitted XRIT. KMA is still working on the L2 software, and expect algorithms to be available by June 2019. This could be incorporated into CSPP-GEO, but CSPP-GEO funding has been reduced to maintenance levels. Propose to close the old action and create a new one:

#### Action PSWG-2

**KMA and SSEC to come up with a plan to make the GK-2A software available to DB users.**

Action PSWG20-7b on bias correction in IAPP. IAPP is maintained as part of CSPP, but no new developments are planned. No specific requirements or recommendations were made by the group, and DWD (who were originally interested in this action) say they are no longer using IAPP products operationally. *Therefore the action is closed.*

The ITSC-20 PSWG recommendations were reviewed and are discussed in the following paragraphs.

Good progress has been made in making ATMS and CrIS available from DBRTN and other DBNet networks. However, the situation with IASI was unclear. Specifically, distribution of IASI L1 data received by Direct Broadcast may be prohibited by the EUMETSAT Data Policy.

**Recommendation PSWG-1 to EUMETSAT**

**EUMETSAT Data Policy be clarified in order to allow distribution of real-time IASI L1 data.**

Tony Reale reported that the GRUAN network would like to foster more collaboration with L2 product developers. There are also valuable collaborations with GSICS. NPROVS is willing to work with L2 product suppliers to evaluate the quality of DB-sourced data. The CSPP team will try to work better with NPROVS to allow evaluations of DB-sourced real-time products. It is recognised that ground sites are also important for CDR evaluation.

**Recommendation PSWG-2 to CSPP team and other DB users**

**Work with the NPROVS team to allow evaluations of DB-sourced real-time products.**

Good progress has been made on user readiness for future hyperspectral products with several initiatives having been carried out since ITSC-20, including: (i) EUMETSAT/ECMWF/NWPSAF hyperspectral workshop, and (ii) EUMETSAT MTGIRS level2 dissemination project, for which another phase is planned in 2018.

Good progress has been made on the CSPP VIIRS Flood Product. Software is due to be released in early 2018, and products are available via web map server (<https://realearth.ssec.wisc.edu/>).

Software to create atmospheric motion vector (AMV) winds from VIIRS and MODIS direct broadcast data could, in principle, be adapted for release as part of CSPP. However, only one prospective user is known at present.

**Recommendation PSWG-3 to DB data users**

**Any DB data users interested in the provision of software to generate their own wind products should contact the CSPP team to register their interest.**

The VIIRS cluster analysis in the CrIS footprint was discussed. There are two aspects to this. The first is the provision of a cluster analysis similar to that provided for IASI in which the mean and standard deviation of VIIRS radiances within the CrIS footprint would be computed (for a small number of clusters) and included in BUFR products. This is thought to be reasonably straightforward, pending an AAPP development planned for 2018, and a new BUFR sequence. The second aspect is that NCEP would like to have VIIRS cloud information associated with each CrIS FOV, using the NOAA enterprise cloud algorithm. If NCEP can clarify what is needed, the CSPP and AAPP teams can look at how it would be provided in DBNet data.

**Action PSWG-3 on NCEP**

**To clarify requirements on VIIRS cloud products within the CrIS FOV, and to discuss with the AAPP and CSPP teams the possible implementation in DBNet.**

At ITSC-20, a problem was raised with the GOES-16 geolocation and metadata not being transmitted until after the whole of the image data. Harris are aware of the issue, but it is not clear whether a change is feasible for GOES-17.

#### **Recommendation PSWG-4 to agencies**

**In order to allow GEO imager low latency applications, agencies should consider providing GEO rebroadcast geolocation data and other metadata in a format suitable for use during the acquisition of the scan sequence.**

### **2.6.3 Review of Topics provided by the ITSC Co-Chairs**

#### ***New and Future Data***

The TROPICS mission was discussed. This is a NASA mission comprising a constellation of 6 smallsats with microwave sensors, to measure precipitation, surface properties and winds. UW/SSEC/CIMSS are part of the project. The launch is planned in 2019. The mission is not intended for near-real-time applications: the timeliness is expected to be in the order of 24-48 hours.

The group welcomed the successful launch of FY-3D, and the plans for distribution of products and DB software. However, station manufacturers would appreciate more details on the interfaces.

#### **Recommendation PSWG-5 to CMA**

**Provide the Space to Ground Interface document for FY-3D as soon as possible, to allow station manufacturers to prepare their systems in advance of the release of software and data products.**

#### ***Pre-launch Preparations***

It was difficult to test processing software for JPSS-1, due to a lack of available pre-launch test datasets.

#### **Recommendation PSWG-6 to agencies**

**Pre-launch test datasets should be provided, well before launch, in order to allow software development teams (e.g., AAPP, OPS-LRS, CSPP) to test Direct Broadcast processing software before satellite launch.**

#### ***Extensions to DBNet***

The group supports the efforts of the DBNet Coordination Group to ensure consistency between global and local data. Noting that FY-3C sounding data are now used operationally at several centres, and noting the relatively poor timeliness of the global data, there is a strong requirement to extend geographical coverage into the southern hemisphere.

#### **Recommendation PSWG-7 to stations participating in DBNet**

**Consider contributing FY-3 sounder data to the DBNet system. For FY-3C this means MWHS-2 and IRAS; for FY-3D, it will be MWHS-2, MWTS-2 and HIRAS.**

IMD have a strong interest in nowcasting applications. It was noted that the MODIS nowcasting products (overshooting tops, fog, stratus, aerosol) are not yet available for VIIRS.

### **Recommendation PSWG-8 to NOAA and the CSPP team**

**Support the creation of VIIRS products for nowcasting, similar to the existing MODIS products.**

As well as processing current data, it was noted that some centres have a requirement to re-process historic data – particularly the RDRs. This requires a complete set of look-up tables to be available. This is not the case for Suomi-NPP, because NOAA does not necessarily re-generate old LUTs when something changes.

### **Recommendation PSWG-9 to NOAA**

**Where possible, provide historical LUTs that are compatible with the latest version of the CSPP SDR processing software.**

It was noted that retrieval of historic data via NOAA CLASS can be a time-consuming process. A group at DWD has developed prototype software that can be used to automate this process (Contact N. Selbach for details), though it would be better if NOAA could do it via the web interface.

### **Recommendation PSWG-10 to NOAA**

**Consider improving the CLASS interface to allow scripted retrieval of historic data.**

It was also noted that NASA have their own version of archived Suomi-NPP data, available via GESDISC (for ATMS/CrIS) or LAADS (for VIIRS). The format is NetCDF4. Liam or Graeme can give details.

### **User Notification**

EUMETSAT and NOAA have systems for notifying users of anomalies, outages, etc. These are thought to be generally OK. Sometimes anomalies are detected by NWP centres, and in this case the ITSC NWP mailing list is used to circulate information. CMA mainly rely on their web site, plus occasional targeted emails; as CMA data become more widely used, it is recommended that CMA implement a more robust system.

### **Recommendation PSWG-11 to CMA**

**Consider implementing a subscription-based anomaly/event notification service, similar to that provided by NOAA and EUMETSAT.**

### **Use of Hyperspectral Data**

Although the CSPP SDR processor can work with either full-spectral-resolution (FSR) or normal-spectral-resolution (NSR) CrIS data, currently the level 2 processors only work with NSR. An update for FSR is planned for March-April 2018. Updates for NOAA-20 are also being worked on. It was noted that for NOAA-20 *all* CrIS FOVs will be available on direct broadcast. For S-NPP, only 7 out of the 9 are available, though this is being re-considered. Also VIIRS M7 may be reinstated.

### **Use of Sounding Data in Cloudy Regions**

A question exists as to what is meant by a cloudy region. In the context of NUCAPS sounding specification it is a region where the IR retrieval fails. It can also be an area designated as cloud-free or some minimum cloud fraction. Clarification is needed.

### **Validation**

The group recognised the usefulness of the NOAA NPROVS datasets of co-located sondes. These will be valuable for JPSS. Interested parties should see the [NPROVS website \(https://www.star.nesdis.noaa.gov/smcd/opdb/nprovs/\)](https://www.star.nesdis.noaa.gov/smcd/opdb/nprovs/).

### **Recommendation PSWG-12 to data users**

**Users should note that L2 profile datasets for validation are available from the NPROVS team, and are encouraged to use them (contact Tony Reale or Lihang Zhou).**

### **Visualisation**

The CSPP web site provides a “Sounder Quicklook” software package for visualising sounder products from NUCAPS, dual regression, IAPP and MIRS. Two-dimensional maps of temperature and moisture at user-selected atmospheric levels; Skew-T plots at user-selected locations; and 2D slices through the atmosphere (along-track) are supported. NPROVS has a visualisation system, called PDISP, for co-location datasets (written in Java).

### **RFI**

This group focused on RFI as it affects reception systems. L-band is liable to interference, as these frequency bands have been sold off, but X-band can also be affected. For example, a station in South Africa cannot receive Aqua, and Honolulu has experienced problems with Terra and Aqua reception.

### **Recommendation PSWG-13 to DB station operators**

**Report instances of RFI (including reception problems) to Richard Kelly. If you are unsure whether specific problems are due to RFI, SSEC is available to help by analysing data samples.**

### **2.6.4 Issues for Software Developers**

At ITSC-20, there was a recommendation for source code for L1 processors to be released. This still applies (e.g., CMA have not yet released FY-3 source code), and should be extended to L2 software also. Some users are not permitted to run software that they do not build from source. Note that the release of source code does *not* mean that the software provider has to help the user to customise the software to suit their own requirements.

### **Recommendation PSWG-14 to software providers**

**Release source code for both L1 and L2 packages, in order to ensure maximum take-up of the software.**

Operating systems were discussed. It would be helpful for users to have a better idea of medium-term plans on what type of platform will be needed to run a particular software package (for example, the CentOS6 to 7 migration).

### **Recommendation PSWG-15 to software providers**

**Provide advance information on plans for implementing new operating system versions and new hardware requirements.**

## 2.6.5 CGMS High Level Priority Plan (HLPP) and CGMS-45 Actions

*1.4.1: Provide for dissemination of satellite derived data and products in one of the four established formats (HRIT, BUFR/GRIB, NetCDF 4 and HDF 5).*

BUFR and GRIB are not likely to be superseded any time in the foreseeable future, so products destined for NWP need to be made available in these formats. If products are created only in netCDF4 (for example), some NWP centers may not be able to use them. However, it does not necessarily mean that the products have to be generated *at source* in BUFR/GRIB: the group supports the use of format conversion tools, such as the one proposed as an NWPSAF deliverable for MTG-IRS. At the same time, processing centres should consider support for NetCDF4 as an input format. (The Met Office has this capability).

*1.4.2: Develop efficient standardized data handling for high-resolution imaging and hyperspectral instruments, employing novel methods like dissemination of hyperspectral infrared data based on Principal Component Analysis.*

Lihang Zhou reported that NOAA does now have a PC product for CrIS.

### **Action PSWG-4**

**Nigel Atkinson to look at the CrIS PC product and compare the implementation with that used for IASI.**

*1.4.3: Facilitate the transition to new direct broadcast systems.*

### **Recommendation PSWG-16 to EUMETSAT**

**Provide the Metop-SG space to ground interface document, when it is available.**

### **Recommendation PSWG-17 to NOAA**

**NOAA to provide information to the GRB community on downlink and software requirements for GOES-S (due for launch March 2018). Support for CSPP-GEO should be continued for GOES-S.**

*1.4.4: Advance the implementation of the CGMS Agency Best Practices.*

The DBNet community is aware of the WMO Guide to the DBNet, and supports its recommendations.

*1.4.5: Support the evolution of the DBNet services to include new satellites and the extension to advanced sounders for at least half of the globe.*

As already mentioned, the group supports the inclusion of advanced sounders in DBNet, and extension to other parts of the globe, particularly in the southern hemisphere.

*3.3.3: Conduct an intercomparison study between the different methods to derive level 2 data from infrared hyperspectral sounders, recognising that there are several software packages available that utilize AIRS/IASI/CrIS data.*

The NPROVS service helps greatly in this area. The PSWG encourages publication of the results from such intercomparisons.

**Recommendation PSWG-18 to researchers involved in L2 studies**

**Continue to publish the results of L2 comparisons, particularly those that involve NPROVS, and report to future ITSC meetings.**

*4.2.1: Continue to foster optimum use of satellite data for weather forecasting, climate applications, and environmental assessments including hazardous events such as volcanic ash and flooding.*

The CSPP team continues to hold several workshops per year, in different parts of the world, which cover these topics. The PSWG supports these initiatives.