

# 14th International Winds Workshop, Jeju, 23 - 27 April 2018

## Report from Working Group 2 (WG2): Data Assimilation

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The discussion in Working Group 2 was lead by Iliana Genkova (IMSG/NCEP) and James Cotton (Met Office) and attended by Mary Forsythe (Met Office), Francis Warrick (Met Office), Alexander Cress (DWD), Stéphane Laroche (ECCC), Katie Lean (ECMWF), Roger Randriamampianina (MET Norway), Gert-Jan Marseille (KNMI), Kazuki Shimoji (JMA), Kirsti Salonen (ECMWF), Chu-Yong Chung (NMSC/KMA), Sihye Lee (KIAPS), Regis Borde (EUMETSAT), Tim Morrow (BoM) and John LeMarshall (BoM).

The following topics were presented and discussed. Top-level actions and recommendations for the attention of CGMS are highlighted in red.

### **1. Common QI in the Global AMVs Inter-comparison (addressing CGMS HLPP 3.2.1)**

It has been a long-standing aim of the winds community to improve the commonality amongst the AMV products (CGMS High Level Priority Plan, HLPP, 3.2.1) in order to make them easier to use within numerical weather prediction (NWP) and other applications. One step toward this goal is the standardisation of the quality indicators (QI) into the so-called Common QI. This was used in the 3<sup>rd</sup> AMV inter-comparison study and it has shown to increase the similarity of the different AMV datasets. The group appreciated the idea behind the Common QI and agreed the improved consistency would be beneficial for NWP. The amount of skill in the QI may vary between the derivation schemes but they can be very useful for protecting against satellite errors e.g. navigation.

**The group encouraged AMV producers to provide the Common QI alongside the existing QI1 and QI2.**

NWP centres supported the AMV inter-comparison efforts and would like to see a number of case studies examined in addition to the existing statistical evaluations, similar to the approach used in the NWP SAF AMV monitoring reports and the first AMV inter-comparison.

### **2. High resolution winds (addressing CGMS HLPP 3.2.2)**

Global NWP, regional NWP, and nowcasting applications have different observational requirements. Several NWP centres within the group (Met Office, DWD, Met. No) are using the NWC SAF software to derive AMVs at higher temporal frequencies and spatial densities for use in regional data assimilation. This is in response to user requirements that are not met by the current AMV products. However in order for AMV producers to implement mesoscale AMVs they need a clear request from users on their requirements. It was agreed that the NWC SAF software could be used to test different target sizes, image intervals etc., in order to specify the optimal configuration for AMVs in regional NWP. This could be done through performing impact studies and evaluating O-B statistics, though the latter may favour smoother fields. In order to make better use of high-resolution winds there is also a need to eliminate error correlations from the AMV speed bias and height bias.

**WG2 Recommendation: Met Office, DWD, Met Norway, to coordinate testing different target boxes, temporal step, etc through O-B statistics and impact studies, and report at next IWW; Preliminary results could be shared via general winds email list or NWP winds email list.**

**IWW14 Recommendation: NWP community to provide input on the best configuration to be used by the AMV producers, for use in global and regional NWP models. Due date: before IWW15.**

The centres are encouraged to discuss with Javier Garcia Pereda about which settings make the most sense for testing. Further directions on the way forward were discussed in the plenary discussion session “Which AMVs for which model?”

(See [http://cimss.ssec.wisc.edu/iwwg/iww14/talks/02\\_Tuesday/1110\\_Plenary\\_Forsythe.pdf](http://cimss.ssec.wisc.edu/iwwg/iww14/talks/02_Tuesday/1110_Plenary_Forsythe.pdf)).

It was suggested during the workshop that the NWC SAF software could be extended to generate polar winds if there was interest and the group agreed this should be explored, assuming the effort required was proportional. This would benefit users e.g. Met. No, who run models in the high latitudes (Arctic) and would help meet timeliness requirements.

### **3. Data timeliness (addressing CGMS A45.02)**

The topic of data timeliness was briefly discussed in view of the topics emphasis for the 7<sup>th</sup> WMO Impact Workshop (2020). Timeliness is important, even for global models, since it has been shown that observations toward the end of the assimilation window have the most impact (C. Peubey and A.P. McNally, Characterization of the impact of geostationary clear-sky radiances on wind analyses in a 4D-Var context, Quarterly Journal of the Royal Meteorological Society, 135, 644, (1863-1876), 2009).

From an NWP perspective, the target for timeliness is zero; the data should be delivered as fast as possible. It was noted by the group that the timeliness of some of the US polar winds data (that not from direct broadcast stations) is poor and that steps should be taken to address this e.g.

- Optimising of processing schedules, so that all satellites can be processed as soon as they arrive
- Use of image pairs, as demonstrated successfully by EUMETSAT, instead of triplets (saves time waiting for the 3<sup>rd</sup> image).

**IWW14 Recommendation to AMV producers: To reduce as much as possible the data timeliness, this especially concerns US Polar winds product.**

### **4. New BUFR template (addressing IWW12.4)**

DWD, Environment Canada, Met Office, ECMWF, and NCEP reported progress towards readiness for the new BUFR template. This is a major piece of work. Most centres are initially storing the new data but only decoding/extracting the equivalent variables from the heritage format (noting that for some the variable names are different). For GOES it would be useful if the data on the GTS could be filtered for the full disk and regional scans via the headers.

One of the main sticking points for NWP centres is the time it takes for changes made to observation processing code to make it through into the operational suite. These kind of code changes typically only happen a couple of times a year. This led to the requirement from IWW13 that test data be made available 9 months prior to commencing a parallel dissemination of data in the new and heritage

formats. This 9-month period was aimed at only the first batch of data appearing in the new format (i.e. GOES) since the code changes made should be compatible with data from all producers in the new format. However it was recognised this may not be the case for all centres.

EUMETSAT plan to release some test data this summer (2018), with a parallel dissemination period starting 9 months later (end Q1 2019).

At the moment NESDIS plans on parallel (old and new BUFR) dissemination until April 2019. However it was recognised that some NWP centres are unlikely to have switched to using new BUFR in their operational systems by that time. Therefore, the following recommendation was made:

**Recommendation to AMV producers: Provide heritage BUFR dissemination until at least July 2019.**

NWP users aim to have switched to the new BUFR by next IWW, 2020.

## **5. Satellite/derivation changes (addresses a recommendation from IWW13)**

The group discussed the transition from GOES-13 to GOES-16, which entailed a new derivation scheme as well as a new generation of imager. It was agreed that the short overlap provided was not sufficient for NWP users to evaluate data and include in their operational systems. As a result most NWP centres have experienced ~4 months (and counting) data gap in their assimilation of winds from GOES East. Impact studies are being conducted at Environment Canada, ECMWF, and NCEP to assess the degradation on forecasts from this gap in AMV (and radiance) coverage. It will be helpful to have such evidence in order to help influence the decision makers higher up the chain.

As a result we strongly emphasise the following recommendation (from IWW13, but worth re-stating):

**IWW14 Recommendation to AMV producers: To provide a 9-month overlap period when transitioning to a new generation of satellite and for major derivation changes.**

For like-for-like satellite changes, a 3-month overlap period is still considered sufficient. For notification and communication of upcoming changes we encourage AMV producers to make use of the IWWG list to ensure important messages are not missed.

## **6. NWP SAF activities**

DWD are a new partner in the NWP SAF for CDOP3 and one of their contributions will be AMV height monitoring against lidar observations. Alexander Cress presented at the workshop some examples of the different plots available: time series, maps, histograms, and profiles. It is planned to separate the AMVs by satellite, channel and level, apart from the profile plots which will show all channels together on one plot. The group agreed this would be a useful addition and are happy with the plan for monthly aggregation.

As well as the routine monitoring, DWD will also contribute towards case study investigations for the NWP SAF AMV analysis reports, and indeed had done so for the recently released 8<sup>th</sup> analysis report which was circulated ahead of the meeting. The group once again acknowledged the usefulness of the NWP SAF AMV monitoring reports. These are beneficial for

- NWP centres who don't have the time/resources to investigate AMV-model differences in more detail,

- AMV producers who also struggle to find time to assist investigations, but it can help focus their efforts.

It was acknowledged that whilst some features identified in the analysis reports are easy to fix (e.g. VIIRS square coverage) most are more complex and can still be a work in progress towards understanding the source of the errors.

## 7. Metop-A/B/C

Equal separation of the three Metop satellites is close to optimal for both AMV generation and for maximising ASCAT data coverage.

**IWW14 Recommendation to EUMETSAT: To consider that “Tristar” configuration for tandem Metop-A/B/C is best for both AMV generation and to maximize ASCAT scatterometer coverage**

## 8. 3D winds

The group recognized the importance of 3D wind profiles and the new products planned e.g. from IASI. Preparations continue in readiness for Aeolus and all centres look forward to a successful launch and obtaining real data

## 9. Workshop and extended abstracts

There are fewer people submitting extended abstracts (proceedings papers) for various reasons, including concerns about being able to publish the work later in certain peer-review journals. The group felt it was important to maintain the proceedings as a lot of work would otherwise go unpublished or not citable. These represent a very useful record of progress made on AMVs over the years. Iliana Genkova and John Le Marshall have offered to help collect and chase-up proceedings papers.

On the subject of the IWWG website, it was suggested to add an AMV publications page and also to link to the Aeolus publications listed on the ESA pages.

It was discussed how best for NWP centres to informally share results/issues in between workshops (there are many new datasets on the horizon), e.g. IWWG NWP email, Google Group.

**Action on WG2 co-chairs: to consider suitable place for sharing results/issues in between winds workshops.**

The group expressed their appreciation for KMA's great job hosting the event and organizing the choice of two tours on the Wednesday afternoon.

The clash with scatterometer IOVWST meeting was unfortunate and we should try and avoid this happening in the future.

Thanks go to IWW14 co-chairs for a successful workshop