Highlights of the 14th IWW and the CGMS-46

IWWG Co-Chairs: Régis Borde (EUMETSAT)
                Steve Wanzong (UW-Madison/CIMSS)

CGMS Rapporteur: Jaime Daniels (NOAA/NESDIS)
# History of IWWG

<table>
<thead>
<tr>
<th>Years</th>
<th>Co-Chair</th>
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<tbody>
<tr>
<td>1996 – 1999</td>
<td>Johannes Schmetz, EUMETSAT</td>
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<td>1999 – 2008</td>
<td>Ken Holmlund, EUMETSAT</td>
<td>Chris Velden (UW-Madison/CIMSS)</td>
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<td>2008 – 2016</td>
<td>Mary Forsythe, Met Office</td>
<td>Jaime Daniels (NOAA/NESDIS)</td>
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<td>2016 – present</td>
<td>Régis Borde, EUMETSAT</td>
<td>Steve Wanzong (UW-Madison/CIMSS)</td>
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Became a formal working group of CGMS in 1994
# History of IWWG (cont)

<table>
<thead>
<tr>
<th>Meeting Number</th>
<th>Date</th>
<th>Location</th>
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<tbody>
<tr>
<td>IWW14</td>
<td>April 2018</td>
<td>Jeju City, South Korea</td>
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<tr>
<td>IWW13</td>
<td>July 2016</td>
<td>Monterey, California</td>
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<td>IWW12</td>
<td>June 2014</td>
<td>Copenhagen, Denmark</td>
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<td>IWW11</td>
<td>February 2012</td>
<td>Auckland, New Zealand</td>
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<td>IWW10</td>
<td>February 2010</td>
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<td>IWW09</td>
<td>April 2008</td>
<td>Annapolis, Maryland</td>
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<td>IWW08</td>
<td>April 2006</td>
<td>Beijing, China</td>
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<td>IWW07</td>
<td>June 2004</td>
<td>Helsinki, Finland</td>
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<td>IWW06</td>
<td>May 2002</td>
<td>Madison, Wisconsin</td>
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<td>IWW05</td>
<td>March 2000</td>
<td>Lorne, Australia</td>
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<td>IWW04</td>
<td>October 1998</td>
<td>Saanenmoser, Switzerland</td>
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<td>IWW03</td>
<td>June 1996</td>
<td>Ascona, Switzerland</td>
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<tr>
<td>IWW02</td>
<td>December 1993</td>
<td>Tokyo, Japan</td>
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<td>IWW01</td>
<td>September 1991</td>
<td>Washington, DC</td>
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14th International Winds Workshop

- Maison Glad Jeju Hotel, Jeju, Korea (23 April - 27 April 2018)
  
  **Local Coordinator:** Sung-Rae Chung (NMSC/KMA), Byung-il Lee (NMSC/KMA)

- **Sponsored by:** KMA, EUMETSAT, WMO, BAE Systems

- **Co-chaired by:** Régis Borde (EUMETSAT) and Steve Wanzong (UW-Madison/CIMSS)

- 40-45 participants

- **Sessions Covered:**
  - Status of operational AMV production
  - AMV derivation
  - AMV quality and impact
  - Use of satellite derived winds in NWP
  - Reprocessing and climate applications
  - Wind Profiles

- **Plenary Discussions**
  - 3rd AMV Inter-comparison study results
  - Which AMVs for which model

- **Working Groups**
  - Wind extraction methods
  - Data assimilation
Plenary 1: Which AMVs for which model

- Improved spatial and temporal capabilities of satellites allow us to generate winds more often so that we may capture wind motion at smaller scales.
- Main motivation was to discuss if AMV requirements are similar for assimilation into high resolution NWP and/or global forecast systems.
- It became apparent that different AMV requirements are needed for producing AMVs that would meet the needs of Global NWP, Regional NWP and Nowcasting.
- Such requirements needs concrete studies which test different configurations of AMVs in the models.

IWW14 Action 3: NWP community to define the best configuration to be used by the AMV producers, for use in global and regional NWP models. Due date: before IWW15.
Third AMV Intercomparison results

- Six agencies participated: CPTEC/INPE, EUMETSAT, JMA, KMA, NOAA/NESDIS, and the NWCSAF
- Funded via NWCSAF VSA; Analysis done by NWCSAF and UW-Madison/CIMSS.
- 3 tests performed using Himawari-8/AHI data on 21 July 2016:
  - **Test 1:** Prescribed configuration using the 10.4 μm channel with the 12 UTC triplet.
  - **Test 2:** Own configuration using the 10.4 μm channel with the 12 UTC triplet.
  - **Test 3:** Own configuration using the 10.4 μm channel with the 0530 UTC triplet. (against CALIPSO).

Main outcomes:
- JMA had the best overall performance using a new HA method (1DVAR plus differential evolution).
- Differences between centres is greater in the height assignment.
- Common QI has real skill in filtering collocated AMVs for an improved statistical agreement.
AMV BUFR sequence
• New AMV BUFR sequence is now officially referenced on the WMO website (Nov 2017).

IWW14 Action 2: AMV producers to adopt the new AMV BUFR template. Due date: end 2019.

Common QI procedure
• Common Quality Indicator (QI) module (Fortran 90) was developed and supplied to the AMV producing centers.
• Common QI found useful during 3rd AMV Intercomparison.

IWW14 Action 1: All AMV producers to implement the “Common QI module” in their algorithms. Due date: before IWW15
Status of CGMS-45 Recommendations

**HLPP.3.2.1** - Establish commonality in the derivation of AMVs for global users where appropriate (e.g., through sharing of prototype algorithms) and consider backwards compatibility when designing AMV algorithms for the 16-channel imagers, so that present state-of-the-art algorithms can be applied to old imagery.

- 3rd AMV Intercomparison study completed
- Design and adoption of new AMV BUFR sequence
- NOAA/NESDIS Forecast Independent QI becomes the Common QI
Status of CGMS-45 Recommendations

HLPP.3.2.2 - Continue research into improved derivation and assimilation of high resolution winds for use in high resolution data assimilation and nowcasting. ICWG and IWWG to liaise as appropriate on the provision of further information characterising the AMV derivation for enhanced QC and error characterisation.

- Many advanced imagers available with more to come.

- Plenary discussion organized at IWW14 on this topic. The following Action was produced.

  **IWW14 Action 3**: NWP community to define the best configuration to be used by the AMV producers, for use in global and regional NWP models. Due date: before IWW15.

- NWP to define best configuration for global and regional models and potentially nowcasting.
Other items of relevance to CGMS

**A44.06: To enhance coordination, ISWGs to discuss with ICWG co-chairs key items for collaboration.**
• There are several logical linkages between the CGMS International Science Working Groups and the IWWG continues to cultivate its interactions/collaborations with the ICWG.

**A44.19: CGMS agencies to explore possibilities to derive winds from new upcoming satellites and opportunities.**
• Wind profiles with AIRS, IASI, CrIS, preparation for MTG-IRS. AMVs to be developed with Sentinel 3...etc

IWW15 to be hosted by ESA/KNMI in Utrecht, the Netherlands, April 2020.
The main goal of this study was to:

- Update the previous AMV intercomparison studies (Genkova 2008/2010, Santek et al. 2014)

- Assess how the cloudy AMVs from each unique wind producer compare, using the JMA’s Himawari-8/AHI satellite data:
  - Verifying the advantages of calculation of AMVs with the newer generation of geostationary satellites.
  - Determining the best options for calculation of AMVs.

- Compute a Common QI for all centers to verify if there is a better agreement.
Participants

BRZ: Brazilian Weather Forecast and Climatic Studies Centre (CPTEC/INPE)
EUM: EUMETSAT
JMA: Japan Meteorological Agency
KMA: Korea Meteorological Administration
NOA: National Oceanic and Atmospheric Administration (NOAA)
NWC: Satellite Application Facility on Support to Nowcasting and Very Short Range Forecasting (NWC SAF)

*Missing CMA, BoM, and ISRO.*
Three different experiments considered, using:

Two triplets of Himawari-8, full disk images (21/July/2016 at 0530-0550Z, 1200-1220Z)

ECMWF ERA-INTERIM NWP Analysis (for the given day – 37 levels – every 6 h.)

Corresponding cloud products (derived by NOAA/NESDIS)
EUM after correction shows a distribution for the CQI similar to the rest of centers.
The bulk distribution of AMV heights is highly variable between the different centers, for collocated AMVs.

Each center using a different Height assignment method, and only EUM/NWC/NOAA using “Cloud products” for this height assignment!

Most similarities for EUM/NWC, both using “CCC method”
Conclusions Brazil

Performance of BRZ algorithm improved with respect the previous AMV intercomparison, with better agreement with other centers (especially, for a high QI threshold and collocated AMV data).

There still exists room for improvement:
- Large differences in height assignment
- Need to verify direction histograms, with some directions much more frequent than others.
Conclusions KMA

AMV histograms do not show significant differences with respect to other centers.

A small check showed statistics with the new April AMV dataset improved a bit.

KMA algorithm is reasonably good, but it needs to define its final stable version.
NOAA agreement compared to other centers improved over previous study.

NOAA algorithm has now 2nd best statistics (along with NWCSAF).

Elements for analysis: vertical distribution of AMVs with no AMVs present between 450-700 hPa (in contrast to other algorithms).
Conclusions NWCSAF

NWCSAF algorithm has 2nd best statistics (with NOAA).

Algorithm basically similar to the one in previous study.

Elements for analysis: some directions with Himaw more frequent than others in the vicinity of 90°
Conclusions EUMETSAT

EUM algorithm much better when QI thresholds high (80%) and specific configuration used (with performance then similar to NOAA/NWC centers).

Similarity in the height assignment of EUM/NWC, both using “CCC method”.

After the correction of the EUM “Common QI”, distribution of CQI values very similar for all centers.
Conclusions JMA

JMA algorithm has the best overall performance considering all validation methods.

This is the most significant change in all AMV algorithms since latest Intercomparison !!

Most likely due to updated cloud height assignment: “optimal estimation method using observed radiance and NWP vertical profile”

However, to be studied if the small difference between AMVs and background NWP has a good impact in later applications, like NWP assimilation.
General Conclusions

Differences between Experiment 1 and 2 basically related to the number of AMVs.

Differences between centers much more related to the height assignment than to the use of a prescribed or a specific configuration.

The use of the Common QI has a real skill in filtering collocated AMVs for an improved statistical agreement.
Further Information

Please visit the IWWG Web page:
http://cimss.ssec.wisc.edu/iwwg/iwwg.html