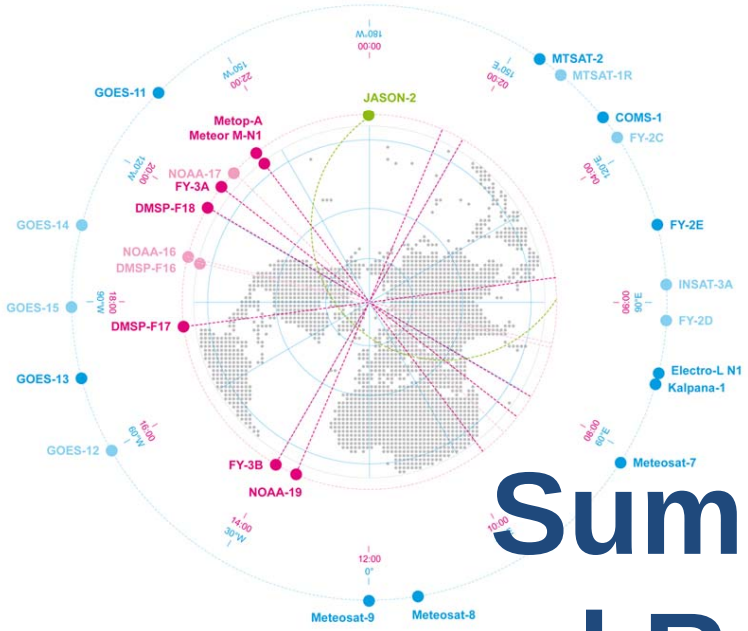


Summary of Highlights and Request for Guidance from IWWG-12

Presented to CGMS43, Plenary Session I, Agenda Item F.1.3

OUTLINE

- Overview of the 12th International Winds Workshop (IWW12)
- Highlights from IWW12
- Top IWW12 Recommendations for consideration by CGMS
- Other Items of Relevance to CGMS

Overview – Summary of IWW12 *(1/2)*

- Hosted by the University of Copenhagen, Copenhagen, Denmark ***(Local Host: Dr. Aksel Hansen)***

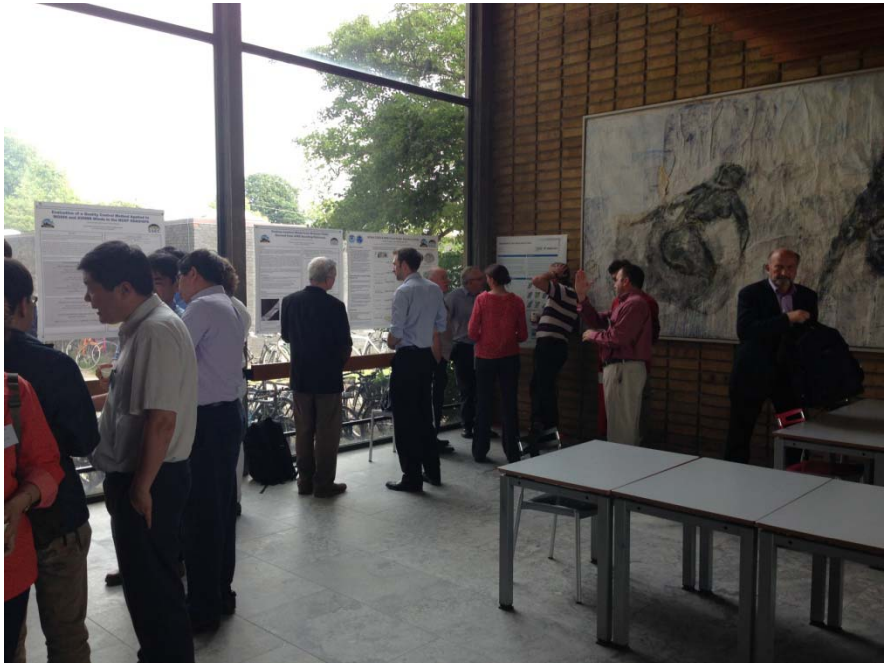
- Co-chaired by Mary Forsythe and Jaime Daniels

- Attended by 65 participants

- **Sessions Covered:**
  - Updates on operational products
  - Latest developments in AMV derivation
  - Use of satellite derived winds in NWP
  - AMV Inter-comparison project
  - MISR, AATSR, and Sentinel Winds
  - Boundary layer
  - High resolution satellite-derived winds

Overview – Summary of IWW12 *(2/2)*

- **Posters**
  - Popular addition to winds workshops
  - Further facilitates interactions and discussions
- **Plenary Discussions**
  - AMV Intercomparison Study Results
  - Winds for High Resolution NWP
  - AMV Height Assignment and Treatment as Layers
- **Working Groups**
  - Wind extraction methods
  - Data assimilation



IWW12 Presentations and Extended Abstracts:
IWWG Web page: *http://cimss.ssec.wisc.edu/iwwg/iwwg.html*

Highlights from IWW12 *(1/5)*

- **A number of new and future satellite missions that will contribute to the generation of atmospheric wind observations**
  - JMA's Himawari-8 (2014), ESA's Aeolus Wind LIDAR (2014), CMA's FY-2G (2014), NOAA's GOES-R ABI (2016), EUMETSAT's MSG-4 (June 2015), China's HY-2B (2015), JMA's Himawari-9 (2016), ISRO's SCATSAT (2015), ISRO's Oceansat-3 scatterometer (2016), EUMETSAT's Metop-C (2018), EUMETSAT's MTG-I (2018), KMA's Kompsat (2018), and China's HY-2C (2019).
- **Several new AMV derivation algorithms have been developed or are in development in advance of the next generation imagers**
  - JMA, NOAA, EUMETSAT, KMA
- **Use of overlapped AVHRR data from Metop-A and Metop-B (both in the same orbital plane) enable the generation of AMVs from the AVHRR instrument over the entire globe for the first time ever.**
  - Fills existing coverage gaps between geostationary and polar AMVs
  - Expected to benefit NWP global analyses and forecasts

Highlights from IWW12 *(2/5)*

- **Very good representation from the scatterometer community at IWW12.**
  - A special boundary layer session was held
  - A splinter group discussion on scatterometer mesoscale NWP was held
- **IWW12 co-chairs invited participation from a member of the International Cloud Working Group (ICWG) to discuss state of the art cloud retrieval algorithms and the activities of the ICWG members.**
  - This invitation was very timely and very well received by the IWWG members.
  - Cloud height very important component of AMV retrievals
  - The scientific discussions and interactions that centered on retrieval of cloud height and cloud microphysical properties were outstanding.
  - Continued interaction between the two CGMS science working groups is recommended

Highlights from IWW12 *(3/5)*

AMV Reprocessing

- Significant progress reported by a number of satellite operators to reprocess AMVs (EUMETSAT, CIMSS, CMA, JMA). Supports SCOPE-CM.
- Good agreement about the importance of all satellite operators reprocessing AMVs with their own best algorithm
- Good discussion at IWW12 about the need and practicalities of reprocessing AMVs using a "Common" AMV algorithm
- Continue work toward use of common algorithm components that are deemed to be the best by the community
  - Product inter-comparison studies are a good means for identifying these
- Noted the utility and importance of reprocessed AMVs beyond reanalysis projects. For example, scientific studies on:
  - Atmospheric circulation and its variability
  - Atmospheric divergence inferred from cloud track AMVs

Highlights from IWW12 *(4/5)*

Winds for High Resolution NWP

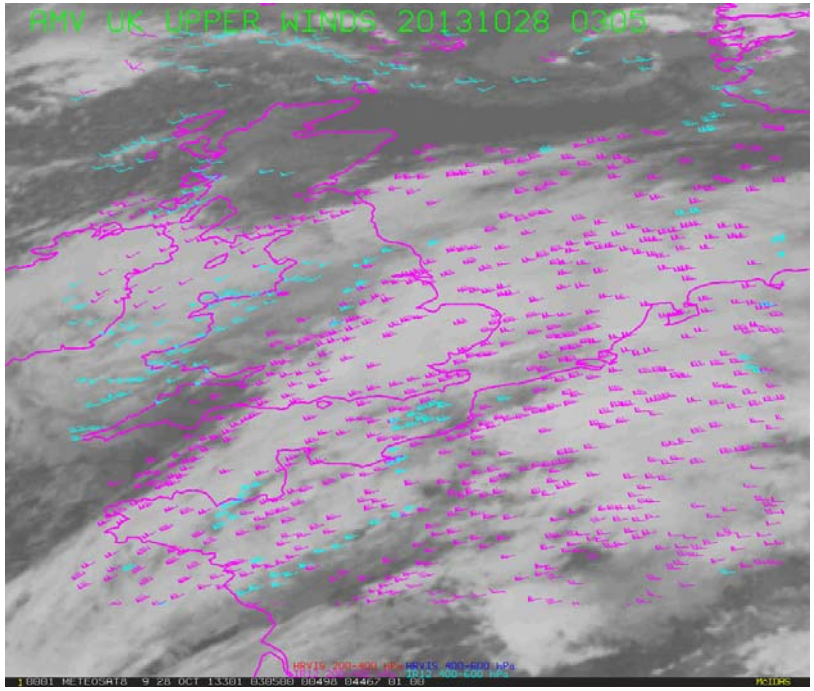
- Development of high resolution satellite winds and an accompanying assimilation strategy are needed for improving forecasts of high impact weather events using high resolution models.

- Current state of satellite-derived wind products
  - AMV products generally capture synoptic-scale flow, but more capable new generation satellite systems, instruments, and retrieval algorithms will enable capture of smaller scales.
  - Scatterometer wind products are produced at increasingly high resolution and are capable of capturing smaller scales of motion. Need for improved temporal sampling.

- NWP considerations
  - The quantity and coverage of observations required to initialize and evolve smaller scales is a daunting challenge.
  - Typical data assimilation strategies (e.g., QC, data thinning, ob error inflation) often results in losing the mesoscale information of interest

- Starting January 2014, locally produced “mesoscale” AMVs, using the NWCSAF AMV package, are being assimilated in the operational UKV data assimilation system.

RAPID SCAN M8 5 MINUTE UKAMVs
During the passage of the St JUDE day storm
2013 OCT 2013 0305-0855



All UKAMVs	
Blue	0-30kts
Yellow	31-60kts
Green	61-90kts
Red	91-120kts
Navy	121-150kts

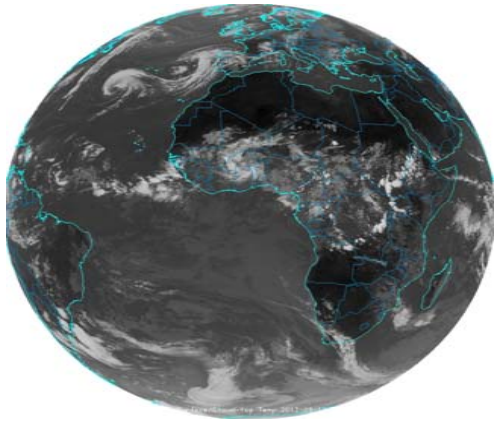
Credit: Graeme Kelly (Met Office)

Highlights from IWW12 *(5/5)*

Second AMV Inter-comparison Study – *(Detailed in CGMS-43-IWWG-WP-02)*

Goals

- Satellite providers asked to generate AMV datasets for four carefully designed experiments using the same inputs (imagery, NWP data)
- Assess resulting outputs produced by the satellite operators and understand differences/similarities of the various AMV algorithm components.



Meteosat-9 10.8 µm from 17 September 2012 at 1215 UTC

Participants

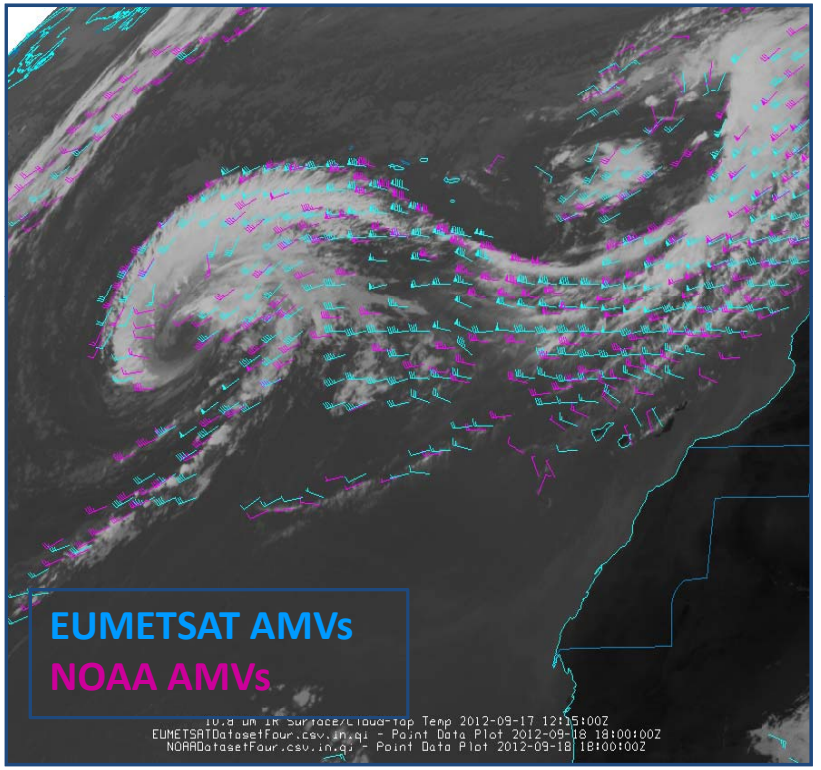
- **EUM:** EUMETSAT
- **CMA:** China Meteorological Administration
- **JMA:** Japan Meteorological Agency
- **NOAA:** National Oceanic and Atmospheric Administration
- **KMA:** Korea Meteorological Administration
- **NWC/SAF:** Satellite Application Facility on Support to Nowcasting & Very Short Range Forecasting
- **BRZ:** Brazilian Meteorological Center

Highlights from IWW12 *(5/5)*

Second AMV Inter-comparison Study – *(Detailed in CGMS-43-IWWG-WP-02)*

Summary of Outcomes

- ❑ Good agreement between the various tracking algorithm used by satellite operators
- ❑ Significant differences observed in other AMV algorithm components used by the different data producers
  - **Target Selection:** Large differences in AMV counts observed . (Up to 500% in some cases)
  - **Height Assignment:** Bulk distribution of AMV heights was highly variable among data producers, even for the simplest cloud height algorithm used. (Mean differences: 30-80 hPa)
  - **Product Quality Indicator:** Significant differences observed in the AMV quality indicators
- ❑ Lessons Learned
  - Common science can be implemented slightly differently
  - Need to focus on specific implementation details to improve understanding of differences
  - Need to continue such inter-comparison studies as a means to converge to common algorithms and to achieve more consistent results between operators



Top IWW12 Recommendations for consideration by the CGMS *(1/2)*

- **IWW12.1.** IWWG to undertake a 3rd AMV Intercomparison study in the 2018-2020 timeframe that will study the effect of using higher spatial, temporal, and spectral resolution imagery from the newest satellite series (Himawari 8/9 or GOES-R) on AMV derivation. The IWWG to coordinate with the ICWG in this study to gain an improved understanding of the cloud microphysics and its potential use for improving retrieved AMVs. Apply a NWP SAF analysis type approach to the results and dig deeper into differences observed by the various satellite operators in order to understand why some algorithms perform better in some situations than others.

- **IWW12.2.** Producers and users to discuss and agree provision of further information characterising the AMV derivation for enhanced QC and error characterisation (e.g., height error estimates from pixel-based cloud schemes, information on the correlation surface, contrast, etc).

- **IWW12.3.** IWWG co-chairs to check current requirements for satellite-derived winds in the GOS and to raise with CGMS (i) how best to increase visibility of AMVs as a driver for the design and operations of future satellite systems and (ii) how best to reflect the higher spatial and temporal resolution requirements of high resolution NWP and nowcasting.

Top IWW12 Recommendations for consideration by the CGMS *(1/2)*

- **IWW12.4.** All producers to consider during design of future derivation systems for next generation satellites the ability to handle existing and where possible earlier generations of satellites (with some expected code modularity to reflect the different channel availability etc). This will remove the need to maintain more than one system, ensure more consistent and improved approaches are applied to all operational satellites and will greatly simplify the approach to reprocessing.

- **IWW12.5.** IWWG community to agree a new standard BUFR template, which when rolled out should be adopted by all producers.

- **IWW12.6.** Continue research into improved derivation and assimilation of high resolution winds for use in high resolution data assimilation and nowcasting.

- **IWW12.7.** Satellite operators to consider coordination of orbits for scatterometer instruments and to provide open and timely access to data in order to maximise independent coverage and benefits to nowcasting and NWP from assimilation of scatterometer wind data

Details captured in IWWG Report: CGMS-43-IWWG-WP-07

IWWG-12 Workshop – Other items of relevance to CGMS

- We would like confirmation of the newly selected co-chairs, Regis Borde (EUMETSAT, Darmstadt, Germany) and Steven Wanzong (University of Wisconsin/CIMSS, Madison, Wisconsin, USA) – Chairmanship begins after IWW13.
- Planning for IWW13: Summer 2016 – Monterey, California (USA)
- There are several logical linkages between IWWG and ICWG and we plan to continue cultivating interactions/collaborations

Further Information

Please visit the IWWG Web page:

http://cimss.ssec.wisc.edu/iwwg/iwwg.html