

# Report From The Working Group of Data Assimilation (WG-II)

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## 1. Introduction

The working group on data assimilation recalled highlights of the last IWW meeting in Helsinki, discussed some pending advances described by Velden et al. (BAMS, 2005). Topics relating to actions from CGMS 33 were also discussed and recommendations concerning the NWP requirements from AMV research and development were made.

## 2. Recalling Highlights of IWW7

**Encouraging results from Meteosat-8 and Kapala-1: Recommendation:** Every satellite production center should include QI information into its buffer data file.

**Height assignment of AMVs is identified as an area of improvement:** WG-II confirms that height assignment of AMVs is still identified as an area of improvement.

**Better characterization of AMV errors.** WG-II confirms several studies (e.g. expected error formulation) have been made since the last workshop

**Better use of AMVs in regional models:** Several NWP centers investigated the use of AMVs for regional forecast models, and recognized the difference in using AMVs between global and regional models. WG-II recommends revision of the QI formulation for use in regional models and also to consider modifying QI thresholds for regional data assimilation.

**MODIS winds:** MODIS winds in use at more than 10 NWP centers now. In order to reduce the receiving time for MODIS winds at NWP centers, WG2 recommends that satellite-derived winds received at direct broadcast sites in polar regions should be transmitted via EUMETCAST to the NWP centers.

**Potential gap of polar winds:** WG-II stresses our needs to close the potential gap in polar winds with new missions and recommends to have a water vapour channel in polar regions.

**Scatterometer winds:** WG-II confirms, that scatterometer winds are an established part of the observing system and widely used in global and regional assimilation systems.

**Outlook to winds from space-based lidar and from hyperspectral sounders:** WG-II is looking forward to get winds from space-based lidar and hyperspectral sounders.

### **3. Pending advances in Velden et al (BAMS 2005):**

a) **WG-II confirms** the substantial impact of space-based wind lidars on the assimilation and forecasting quality of global NWP models.

c) **WG-II encourages** more researches on wind profiles derived by hyper-spectral sounder retrievals, especially regarding vertical resolution and dependence on forecast fields used in the retrieval.

### **4. Recommendations from CGMS 33**

**Recommendation 5 Potential to utilize derivatives from AMVs: WG-II pointed out**, that at this time it is still difficult to assimilate derivatives (e.g. divergences and vorticity) from AMVs and most current uses are for validation purposes and nowcasting.

**Recommendation 7: Better description of AMV errors: WG-II recommends**, that satellite centers should further develop a quality indicator for height assignment to help better using AMV winds. Additionally, the satellite wind producers should increase efforts to reduce the dependency of quality indicators on model fields or other observations in quality control.

### **5. EUM-Working Paper-16 to CGMS 33**

**Action v: WG-II recommends**, that both satellite data providers and NWP centers should use synthetic spectral satellite images as research tool in order to increase the understanding of possible error sources in the process chain of AMV winds and to learn more about the errors structure of the AMV winds.

**Action vi: WG-II supports** the efforts of JMA and EUMETSAT in reanalysis projects and strongly **recommends** that other satellite operators should conduct similar activities.

## General topics

**I: WG-II identifies** following areas, where AMV progress have most to offer:

- 1) height assignment
- 2) polar winds
- 3) winds derived from AVHRR

**II: WG-II pointed out**, that the communication between the data production centers and the users (NWP centers can be improved. **WG-II recommends**, that test data for a sufficient overlap period (2 months at least) is necessary when there is a change of satellites. WG2 welcomes the EUMETSAT approach, beside the METESAT 8 to METEOSAT 9 plans.

**III: WG-II outlines** following projects of international collaboration:

- a) assimilation of simulated images
- b) comparison of derived wind data sets out of MSG triplets from one day, provided by EUMETSAT for different satellite provider centers **Action** on EUMETSAT to make the triplets available. Results are expected at the next workshop.
- c) Use of simulated wind data for comparison

## 6. NWP requirements for AMV research and development

**I: General points for wind producers from NWP**

- a) **WG-II confirms** the importance of continuation of coverage and stresses out the threat of losing polar winds (several studies in the workshop showed positive impact of MODIS wind).
- b) **WG-II recommends** to generate and disseminate AVHRR IR wind products and that the NWP community should test the quality and impact of AVHRR winds.
- c) **WG-II recommends** that all data providers should implement QI and RFF indices and that all data centers should use the same buffer format (templates).
- d) **WG-II recommends** to explore ways to implement forecast independent tracking systems and encourage further research on the derivation of quality indicators
- e) **WG-II recommends** to survey which QI and observation errors are used at different NWP centers. The information should be sent to Mary Forsythe (Action).
- f) **WG-II recommends** routinely monitoring of GOES AMV winds with and without autoeditor by NWP SAF.

## II: Areas which require effort from wind producers and NWP

- a) **WG-II pointed out** that studies concerning the representativeness of the wind (mean value for a layer instead of a single level information) have a lot of potential to improve the use of AMVs in NWP systems. **Action:** For the next workshop Christopher Velden will give information about layer averaging from cloudy and clear sky AMVs

## III: Areas for revision in the assimilation of AMVs

- a) Quality control procedures need to reflect current data characteristics, therefore more information is needed from satellite producers, especially regarding quality of height **WG2 recommends** that NWP centers should revise the use of quality control indices.
- b) The Working Group encourages studies to further investigate horizontal and temporal error correlations and how we should take them into account in modern data assimilation schemes including a possible temporal thinning.
- c) There is a need to develop better ways to deal with biases. **WG2 recommends** studies to better understand where the observation biases come from and if a bias correction should be taken into account

## 7. References

Velden, Ch., Daniels, J., Stettner, D., Santek, D., Key, J., Dunion, J., Holmlund, K., Dengel, G., Bresky, W., Menzel, P.: Recent innovations in deriving tropospheric winds from meteorological satellites. American Meteorological Society, 205-223