

STATUS OF POLAR ATMOSPHERIC MOTION VECTORS FROM AVHRR ON METOP

In response to CGMS action 34.21

EUMETSAT has started to work on the development of polar Atmospheric Motion Vectors (AMVs) from the full resolution data of the Advanced High Resolution Radiometer (AVHRR/3) on Metop-A. This product is an agreed product in the frame of the so-called Day-2 development activities for EPS products.

Besides drawing on the experience and expertise with geostationary AMV from Meteosat satellites EUMETSAT has started a cooperation with NOAA/CIMSS, to take into account their expertise with MODIS and AVHRR winds.

The paper briefly describes relevant aspects and status. It is expected that a first prototype will be available in spring 2008. The availability of the product is planned for end 2008.

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1 INTRODUCTION

In the preparation and definition of the Metop applications ground segment the user community, notably ECMWF, expressed interest to have winds over the Polar Caps derived from AVHRR products. Consequently an EPS User Requirement for this product exists: It is mandatory, if feasible to derive Polar Cap winds at at least 45 km horizontal sampling with the objective to achieve 25 km sampling.

More recently a relevant EUMETSAT Delegate Body meeting recommended developing such product and including it into the EPS/Metop processing.

2 SCIENCE ASPECTS AND DEVELOPMENT STATUS

2.1 Scientific Aspects

There is no reason to restrict the wind derivation to the AVHRR data from the Metop satellite only. It is in theory possible to derive winds from combinations of Metop and NOAA passes, thereby increasing the wind coverage. However the difference in horizontal resolution between Metop (full resolution AVHRR at 1km in the sub-satellite point) and NOAA GAC (AVHRRat ~ 4 km resolution) data is an issue in this case that would have to be resolved. The use of data from the EUMETSAT AVHRR Retransmission service could potentially alleviate this problem, but differences in instrument performance would still have to be accommodated for.

One of the big challenges is to perform a proper height assignment of the tracked cloud features. For semi-transparent and broken cloud layers operational standard methods rely on a combination of IR-window with 6.2 μm or 13 μm channel data. Unfortunately the relevant channels are not available on AVHRR, implying that it will not be possible to apply these methods to correct for broken or semi-transparent clouds. This is a major drawback, potentially having a severe impact on the quality of many winds. In order to alleviate this problem EUMETSAT will perform science studies and prototype work to use collocated IASI data for multispectral height assignment.

It is also interesting to note that recent Observation System Experiments (OSE) at ECMWF show the value of AVHRR derived winds. However, in comparison to MODIS winds, a lack of winds over ice is notable. This is due to the WV winds from MODIS which are not possible with AVHRR.

2.2 Development

A dedicated AVHRR Winds Processing Module will have to be developed. Several implementation options within the EUMETSAT Ground Segments are possible and are currently being investigated.

The activity to develop this product has been started in June 2007. A joint team of in-house experts for AVHRR and Meteosat Second Generation Atmospheric Motion Vectors was formed. In addition the team is in contact with relevant teams outside Eumetsat, in particular with NOAA/NESDIS and CIMSS (Co-operative Institute for Meteorological Satellite Studies) that already have significant expertise in deriving winds over the polar regions with MODIS and AVHRR. It is planned to install the NOAA/CIMSS software in EUMETSAT as a prototype and reference processor. Co-operation with NESDIS and CIMSS has been initiated in August 2007.

The initial implementation foreseen would be based on Metop-A AVHRR only. Subsequently AVHRR data from NOAA satellites could be included in order to reduce the time interval between images. As a second step the potential improvement of the height assignment with IASI profile data will be investigated and developed.

3 CONCLUSIONS

Activities to develop an operational polar AMV product from Metop-A AVHRR have been started. The planning is to pursue the development in the course of 2007/2008 and implement the resulting product towards the end of 2008. The cooperation with NESDIS and CIMSS is important and appreciated.