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Evaluation of METOP-AVHRR and METEOSAT-SEVIRI reprocessed AMVs

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Long-term data record of well validated, quality controlled and homogenized Atmospheric Motion Vectors (AMVs) are an essential input to numerical weather prediction models for reanalysis, as well as to the climate research community for monitoring wind time-series and for analysing wind parameterizations in their models. The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) participates in the European Re-Analysis of global CLIMate observations (ERA-CLIM) project. One of EUMETSAT's contributions within the ERA-CLIM project is the generation of AMVs. For this, data from METOP AVHRR have been processed to generate AMVs over the poles back to the year 2007, whereas data from METEOSAT SEVIRI have been reprocessed to generate AMVs over Europe, Africa and the Atlantic Ocean, back to 2004.

The polar AMVs were generated with two algorithms. Firstly the EUMETSAT operational algorithm and secondly an adapted algorithm developed at the Cooperative Institute for Meteorological Satellite Studies (CIMSS). Although both algorithms utilise the IR window channel (11 [U+F06D]m) from AVHRR, they differ with respect to the use of satellite orbits, tracking of clouds, the use of weather forecast model data and the quality analysis of resulting wind vectors. The AMVs from METEOSAT were generated with EUMETSATs operational algorithm for geostationary satellites, which retrieves AMVs from 15 minutes observations in the infrared, water vapour and visible channels of SEVIRI.

In our presentation we will show the results of a systematic analysis of the differences between the two polar AMV algorithms. The differences between both algorithms will be presented through a qualitative time-series analysis over the period 2008 till 2012, whereas their validity is assessed against radiosondes, dropsondes and Numerical Weather Prediction (NWP) model data. Moreover, the strengths and weaknesses of the algorithms will be discussed. The METEOSAT derived AMVs will also be validated against radiosondes and NWP data. In the northern and southern overlap region a comparison with polar AMVs will be performed. Finally, the quality information will be evaluated over the entire time period.

The first results from the polar AMVs show more mid and low level winds in the CIMSS dataset. A higher average speed for the EUMSTAT dataset, but in general a very similar wind pattern. The evaluation of the long-term quality of METEOSAT derived AMVs reveals a significant reduction in the AMV quality due to satellite maintenance activities.