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Evaluation of two AMV Polar winds retrieval algorithms using five years of reprocessed data

Roger Huckle, Joerg Schulz, and Rob Roebeling
EUMETSAT, USC, Darmstadt, Germany (rob.roebeling@eumetsat.int)

The Advanced Very High Resolution Radiometer (AVHRR) has been flying onboard polar orbiting satellites for more than 30 years and thus provides a suitable data source for climate research. 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 polar Atmospheric Motion Vectors (AMVs) from METOP AVHRR data back to the year 2007. EUMETSAT employs the EUMETSAT operational algorithm and an algorithm developed at the Cooperative Institute for Meteorological Satellite Studies (CIMSS). Both algorithms utilise the IR window channel (11 [U+F06D]m) from the AVHRR. But the algorithms 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. Thus, the generation of two AMV records enables the systematic analysis of the differences between the two algorithms and versus independent ground truth.

In our presentation we will show results obtained with the two algorithms and will discusses the differences between the two algorithms, their strengths and weaknesses including validation results against radiosondes, dropsondes and Numerical Weather Prediction (NWP) model data. A focus of the analysis will be for the time periods with additional in situ measurements available. This includes the International Polar Year (IPY) 2008 and the ConcordIASI campaign in 2009 in Antarctica. For several cases the comparison results show that the number of wind vectors detected by the two algorithms differs slightly, with the CIMSS algorithm generating about 20% more vectors. The number of winds computed at different heights, shows that the CIMSS algorithm gives more low level winds compared to the EUMETSAT algorithm. The speed BIAS against NWP data for the EUMETSAT algorithm seems to be positive and for the CIMSS algorithm slightly negative. In our presentation the differences between both algorithms over the entire five years period will be presented through a qualitative time-series analysis.