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Climate Data Records of Atmospheric Motion Vectors from EUMETSAT satellites

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Within the Copernicus Climate Change Service (C3S), EUMETSAT has generated Climate Data Records (CDRs) for Atmospheric Motion Vectors (AMVs). AMVs are derived from consecutive satellite images by identifying the displacements of cloud or water vapour structures, depending on the channel used for the measurement, retrieving a speed and direction of their movement. Assigning the correct height for the detected wind vectors is one of the main sources of uncertainty. A Quality Indicator (QI) provides an estimation of the quality of each single retrieval.

The presentation will focus on AMV CDRs derived from geostationary Meteosat satellites located at 0° latitude and over the Indian Ocean as well as AMV CDRs derived from AVHRR data from the polar orbiting Metop-A and B satellites. Due to the long time series of Meteosat measurements and global coverage achieved using AVHRR measurements from two Metop satellites together, AMVs represent an important wind information for global Numerical Weather Prediction (NWP) re-analysis as well as a possible indicator for climate change studies. EUMETSAT AMV CDRs have been used in past global re-analysis and are planned to be assimilated in the future 6th European Re-Analysis (ERA6) at the European Centre for Medium range Weather Forecast (ECMWF).

AMV CDRs are produced aiming at a homogeneous as possible time series. The Meteosat time series are almost 40 years long including two different satellite generations, Metop time series approach 15 years. The number of spectral channels and instrument characteristics have changed between the two Meteosat generations. To arrive at a homogeneous record these changes need to be taken into account and only spectral channels that are common to all instruments in a time series are used. Such long, homogeneous data records are very suitable for data assimilation and climate studies. The AMV CDRs have been validated against and compared to radiosondes, reanalysis data from Numerical Weather Prediction (NWP) models and operational near real time satellite products.

We will present the C3S AMV CDRs, their quality and show their potential for climate research application. First results from a potential application of those CDRs to monitor climate change by an analysis of the position of the jet stream will be included. Future developments will include polar orbiting AVHRR AMVs CDRs of more than 40 years.