EUMETSAT Satellite Data Records For Reanalysis

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EUMETSAT participates in the EU FP-7 project European Re-Analysis of global CLIMate observations (ERA-CLIM). This project has the major task to prepare all kinds of observations for a next major century long reanalysis. Within ERA-CLIM EUMETSAT is regenerating radiance data and a couple of geophysical products for almost all its instruments in geostationary and polar orbit. Particularly, the reprocessing of the radiance data has the goal to establish data records suitable for reanalysis and climate analysis. Instrument records are carefully analysed and where possible corrected for a number of deficiencies. The inter-calibration of instruments following the principles and methodologies of the international Global Space Based Inter-calibration System (GSICS) activity might alleviate the assimilation process by leading to a more homogeneous bias correction per instrument class in the NWP systems.

Observations from EUMETSAT's series of Meteosat First Generation (MFG) and Meteosat Second Generation (MSG) geostationary satellites spans a period from 1982 to today for the zero degree longitude sub-satellite position and from 1997 to today over the Indian Ocean providing data for climate analysis at multi-decadal scale. However, heterogeneities in the time series are introduced due to successive radiometers having different and sometimes not well known filter functions, due to changes in calibration methodology over time and due to other effects as instrument aging. To improve the quality of the Meteosat radiance time series an activity has been introduced in the framework of GSICS that targets the inter-calibration of this climate-relevant series of weather satellite observations. Different strategies have been developed to inter-calibrate the complete time series of the MFG and MSG radiometers employing HIRS and IASI measurements.

Within ERA-CLIM EUMETSAT re-processes Atmospheric Motion Vector (AMV) and Clear Sky Radiance (CSR) products from Second Generation Meteosat-8 and Meteosat-9 Image data for the period January 2004 to present. The various algorithms leading up to the generation of AMV and CSR products have significantly improved during the early operations of the MSG spacecrafts. Furthermore, the geo-located and calibrated images of Meteosat-8 (M-8) and Meteosat-9 (M-9) were impacted by a change of the radiance definition with a subsequent reprocessing of the M-8 and M-9 radiances. These changes warrant a full re-processing of the M-8 and M-9 AMV and CSR products. The reprocessing of MFG AMVs and CSR data since 1982 to ensure consistency with the MSG Data is envisaged but first the radiances need to be inter-calibrated. Over Polar Regions not covered by geostationary satellites the coverage for AMVs is extended from 2007 onwards, by generating these winds using Metop-A AVHRR imagery data.

Another major activity in creation of high quality data records is the generation of a consistent radio-occultation data from various radio-occultation missions since September 2001. Such data have very high value for reanalysis and are by now widely recognized as climate benchmark measurements, in particular for upper tropospheric and lower/mid stratospheric temperature information. The processing of the raw observations into products that can be used for reanalysis purposes differs from one data provider to the next. Thus, the main objective of EUMETSAT’s reprocessing is the provision of consistently processed bending angle data from September 2001 to present using data from the CHAMP, GRACE, COSMIC and GRAS missions.

In addition to these major components of the ERA-CLIM project there is an attempt to derive a consistent total ozone dataset from GOME-2 and IASI (Infrared Atmospheric Sounding Interferometer) data for the period July 2007 to present, because the Metop satellite provides the unique opportunity of simultaneous observations in these two spectral regions with the GOME-2 and IASI instruments. A processing of the GOME-2 radiance spectra has been performed to create a homogeneous basis for the correction of instrument aging effects as a function of time, spectral, observation angel.

This presentation provides an overview of EUMETSAT's activities in data set generation for ERA-CLIM, in particular, the radiance inter-calibration activities and AMV products. It will present the status of the activities also giving tentative dates for the release of data products that will be available free of charge from the EUMETSAT Data Centre. Input from the community on longer term plans of EUMETSAT data record generation activities is welcomed and will hopefully need to a high impact of our observations in reanalysis activities.

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