

CLIMATE@EUMETSAT: From Space-Based Measurements to Climate Data Records

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The use of satellite data for assessing the status of past climate is still in its early stages. Satellite data became only available in the mid 1960s from some experimental research missions and first operational missions such as the fleet of geostationary satellites and also satellites in polar orbit were built for the purpose of monitoring and forecasting the weather. These data can well support environmental monitoring applications, however, it is recognised, that higher level applications such as climate variability and change analysis require well calibrated observations and long-term homogeneity of long time series. Satellite data of such kind are referred to as Climate Data Records (CDR) and are generated through careful recalibration and reprocessing activities.

EUMETSAT addresses climate monitoring employing its historical and current operational satellite systems and in the planning of future satellite systems. The work involves specific scientific and technical efforts for the re-calibration of historical data and the extraction of climate data records. In particular, the scientific analysis of raw satellite data leading to the characterisation of uncertainties of the measurements, the identification and corrections of artefacts, as well as improved calibration of individual instruments and inter-calibration of several satellite instruments in a time series is fundamental to serve the generation of physically consistent data records of geophysical variables by reanalysis or the application of retrieval methods.

Once the re-calibration process has been completed, instrument measurements can be reprocessed to extract basic physical parameters (e.g., reflectance, radiance, radar backscatter) and to produce long-time series known as Fundamental Climate Data Records (FCDR). These present the material from which geophysical parameters, e.g., GCOS Essential Climate Variables (ECVs) can be extracted. Production and continuous improvement of FCDRs are therefore a top priority for EUMETSAT. This demands in-depth understanding of instruments, revising calibration and characterisation data, algorithm research and complex techniques to determine uncertainty of the data.

This presentation will demonstrate EUMETSAT's recent advances and prospects for providing useful satellite-based climate data records for major applications in climate science and services.