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Using satellite precipitation data for hydrological modeling

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The growing demand for precipitation data covering larger areas of the globe as lead to the need of innovative approaches to the operationalization of data streams. One possible classical solution is combining and calibrating various ground radar stations, however the availability and cost of these data streams work against its use for global coverage . The alternative is to use Earth Observation data from satellites. There is a wide range of weather data available from polar orbital satellites with sensors for measurements. The biggest advantage is that the spatial coverage is wide, however the temporal resolution for the covered area is more limited. To take advantage of the better of two worlds, geostationary satellites can be used to give the temporal resolution for the same covered area at a regular interval. EUMETSAT's Multi-Sensor Precipitation Estimate (MPE) is based on a classical blending algorithm. This algorithm combines SSM/I instruments on DMSP satellites with the 10.8 micron IR window channel on Meteosat satellites. The result is precipitation estimates with a spatial coverage on most of Europe and Africa and a temporal resolution of 15 minutes.

To be able to receive the latest MPE data from EUMETSAT in near real-time a reception station for EUMETCast needs to be set up. With this reception station all data received from Meteosat satellites can be acquired as well as third-party products. The data is post-processed by Meteorological Products Extraction Facility of EUMETSAT, mostly for correction of image distortion and quality assurance. Due to this the data is received with a delay of about 15 minutes.

MPE data is stored, by default, in Geostationary Satellite View projection and needs to be transformed into a usable projection system. Projections are translated into WGS84 after which they can be interpolated onto a regular spaced latitude/longitude grid. This paper handles the description of the process of transformation and interpolation strategies for the MPE data.

Since the MPE data is an estimate rather than a measurement, the data presents the need for validation. Comparison of the MPE data with ground radar and ground measurements will show the usability for hydrological modeling according to realistic scenarios. The end purpose is improving precipitation estimates by calibration, using ground radar and ground measurements where available. This study also researches their relations and combination approach.