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Validation of the Cloud Dynamics and Radiation Database (CDRD) precipitation retrieval algorithm using Tropical Rainfall Measuring Mission (TRMM) radar-radiometer observations over the Mediterranean area

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Physically-based approaches for precipitation retrieval from space-borne passive microwave (MW) radiometers are based on the use of Cloud Radiation Databases (CRD's) within a Bayesian inversion scheme. Within EUMETSAT's *Satellite Application Facility on support to Operational Hydrology and Water Management* (H-SAF), we have developed a large CRD database optimized for the European area. This consists of the outputs of the numerical simulations of 60 precipitating events that have been performed by means of the University of Wisconsin – Nonhydrostatic Modeling System (UW-NMS), and of the associated upwelling brightness temperatures (TB's) that would be measured by satellite-borne microwave radiometers, which have been simulated by means of an appropriate radiative transfer scheme.

In order to reduce the retrieval uncertainty and improve the retrieval performance, we have expanded the CRD approach by generating a so-called Cloud Dynamics and Radiation Database (CDRD) approach that incorporates dynamical/thermodynamical/environmental information (including lightning) in addition to the upwelling TB's.

In this paper, we describe the CDRD algorithm and the results of a validation experiment over the Mediterranean area (25N-36N ; 25W-40E). To this end, we apply the CDRD algorithm to a large number of MW observations taken by the TRMM Microwave Imager (TMI) onboard the Tropical Rainfall Measuring Mission (TRMM) space observatory, and compare the retrievals with concurrent measurements by the TRMM Precipitation Radar (PR). Then, in order to quantify the impact of the additional information on the retrievals, we compare the error statistics of our CRD and CDRD algorithms.