

Precipitation retrieval and analysis of severe storm events based on satellite observations, lightning data, and cloud model simulations: Application to the FLASH project

A. Mugnai (1), D. Casella (1), F. Di Paola (1), S. Dietrich (1), J. Hoch (2), A. Metha (3), E.A. Smith (3), and G.J. Tripoli (2)

(1) Istituto di Scienze dell' Atmosfera e del Clima, CNR, Roma, Italy; (2) Dept. of Atmospheric and Oceanic Sciences, University of Wisconsin, Madison, Wisconsin, USA; (3) Goddard Space Flight Center, NASA, Greenbelt, Maryland, USA.

(a.mugnai@isac.cnr.it / Phone: +39 06 4993.4575)

In this study, we first describe a unified precipitation retrieval and analysis framework that combines all available satellite observations in conjunction with ground-based and space-based lightning measurements and with atmospheric simulations produced by a cloud resolving model (CRM).

In particular, we describe the Cloud Dynamics and Radiation Database (CDRD) approach for passive-microwave (MW) precipitation retrieval, which is based on extending the Cloud-Radiation Database (CRD) method used by most physically-based MW algorithms, particularly Bayesian algorithms, by incorporating an extensive mix of the CRM's dynamical, thermo-dynamical and microphysical variables – that are not used in the CRD approach – so as to reduce the retrieval uncertainty and improve the retrieval performance.

Finally, we describe how this unified framework will be implemented within the FLASH project in order to take advantage of the respective strengths of the different data sources in combination with the CRM in monitoring and nowcasting hazardous, flood-producing storms that intermittently strike the Mediterranean coastal regions.