Consiglio Nazionale delle Ricerche
Istituto di Scienze dell'Atmosfera e del Clima
Sede

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Measurement and characterization of rain Drop Size Distribution

Elisa Adirosi (CNR/ISAC)

The Drop Size Distribution (DSD) is defined as the number of drops per unit volume of air and per unit of drop diameter interval and is the result of different physical and microphysical processes involved in the formation and evolution of rain. It can be estimated by instruments named disdrometers and is modelled with different theoretical distributions. The estimation of DSD has an influence on a wide range of applications in the study of several geophysical processes occurring in the atmosphere and on the land surface. An improved knowledge of the DSD has an impact on the studies related to the soil erosion caused by the impact of raindrops on the ground. The choice of DSD shape plays a central role in cloud resolving models, and in model data assimilation. DSD is relevant, also, in microwave communications for dealing with rainfall attenuation that affects the propagation of waves. Finally, quantitative precipitation estimation by means of remote sensing techniques, both obtained from satellite-borne sensors or ground based weather radars, necessarily requires certain underlying assumptions, which are directly related to and affected by characteristics of the DSD of the measured precipitation.
The main research carried out during my carrier had the aim of improving the characterization of the microphysics of rainfall, addressing key topics in modeling DSD and its impact on radar rainfall estimation, and of shedding some light on the impact on DSD modelling of instrumental errors as well. The main findings of my studies will be presented along with ongoing research in order to explore new collaborative fields of research.