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# X-band radar field campaign data analysis for orographic/warm-rain precipitation processes

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Accurate quantitative precipitation estimation over mountainous basins is of great importance because of their susceptibility to hazards such as flash floods, shallow landslides, and debris flows. It is usually hard to obtain reliable weather radar information in mountainous areas, due to difficulties connected to non-meteorological scattering and the elevation of the study sites. Such regions are particularly interested by orographic/warm-rain precipitation processes, characterized by no ice phase in the cloud and prevailing concentration of small drops in the drop size distribution.

Field campaigns are able to provide complete and solid datasets in mountainous regions, thanks to mobile radars and the complementary information provided by rain gauges and disdrometers. This study analyzes datasets collected during the Hymex, IPHEX, and Colorado field campaigns in mountainous areas in Italy, France, North Carolina, and Colorado. Mobile X-band radars from the NOAA National Severe Storm Laboratory and the Advanced Radar Research Center at the University of Oklahoma are utilized. The X-band dual polarimetric radar data are corrected for attenuation through the SCOP algorithm, and evaluated against disdrometer and rain-gauge data. Warm-rain events are identified by looking at the Gorgucci, Cao-Zhang, and Kumjian-Ryzhkov parameter spaces relating polarimetric radar variables to precipitation development processes in the cloud and rain size distributions. A conceptual model for the vertical profile of precipitation and microphysical structure of the cloud is also derived, to be contrasted against other typical convective and stratiform profiles.