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Orographic impact on the precipitation horizontal and vertical variability and the associated microphysical processes in the Cevennes region during HyMeX SOP-1

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During, the first Special Observation Period (SOP-1) of the HyMeX campaign, in fall 2012, a specific observational network has been set-up in southern France with the aim to better understand the role and the impact of a complex terrain on the horizontal and vertical structure of rainfall and the associated microphysical processes.
In this presentation, we will show that the topography of the region has an impact on the rainfall horizontal and vertical structure at fine scale and that rainfall regimes also have an influence on the DSD. Furthermore, we will focus on the microphysical processes being modified and on their modification by the underlying orography. A more detailed study based on the evolution of the shape of the DSD with regard to different rainfall regimes reveals that the coalescence mechanism seems dominant above the height of the local topography and for heavy rainfall. However, as we get closer to the ground, modifications of the observed DSD indicate that other microphysical processes such as break-up, evaporation or updraft effects might compete with the coalescence mechanism. Furthermore, these processes are affected by their direct environment with a more important break-up mechanism as the local terrain becomes more complex and the role of updraft and evaporation being more important over flatter terrain.
In a second part of the presentation we will also consider the representativity of the rainfall structure and the associated microphysical mechanisms within a bulk model such as WRF. Using the WRF model and a two-moment microphysics scheme, we can calculate DSD spectra from the diagnostic variables of the model. A detailed comparison between these calculated DSD and the observed ones show that the impact of the underlying relief on the horizontal rainfall structure is well represented by the model. However, the vertical structure of precipitations from the simulation lacks the variability observed during an event.