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Shallow Orographic Convection contribution to the water resources in Mediterranean

Angélique Godart (1), Sandrine Anquetin (1), Etienne Leblois (2), and Jean-Dominique Creutin (1)

(1) Grenoble Université, LTHE (CNRS, UJF, IRD, INPG), BP53, 38041 Grenoble Cedex, France (sandrine.anquetin@hmg.inpg.fr), (2) Cemagref, UR HHLY, CP 220, 3bis Quai Chauveau, 69336 Lyon Cédex 9, France

Molinié et al. (2010) analyzed extreme rainfall rates at different accumulation periods (hourly to daily time steps) over the French Mediterranean region. Up to 100-year return-values are obtained from the long-term hourly rain-gauge database of OHMCV. Results show very different patterns of rainfall statistics across accumulation time steps. For a daily time scale, the relief significantly influence the statistics, whereas for the hourly time step, no specific signature is observed. Moreover, the rainfall intermittency is found lower in the mountainous area than in the piedmont and plain areas. These results invite to understand how convection properties determine these space and time features of rain variability.

Miniscloux et al. (2001) demonstrated that, during Mediterranean storms, shallow banded convection is persistently established over prevailing locations in mountainous areas like the Cévennes – Vivarais region in France. The intensity produced by these rain bands is moderate, around 10mm.h-1. Nevertheless, the resulting cumulated rainfall can be large when the bands are associated with a stationary flow that depends on the synoptic-scale steadiness. Bands are oriented parallel to the flow (Gysi, 1998; Anquetin et al., 2003) and they are associated with shallow convection: the vertical extension of the clouds does not exceed 6km as deduced from the vertical profiles of radar reflectivity.

Numerical studies have already been carried out to bring to the fore spatial and temporal characteristics of such rain bands and to identify their necessary synoptic triggering ingredients.

This paper points out the contribution of the precipitation associated to shallow convection to the rainfall regime of the Cévennes – Vivarais region. A specific weather class that purely corresponds to shallow convection is proposed by Godart et al., 2009a-b. The evaluation of its occurrence during the 1976 – 2006 period shows that the contribution of the shallow orographic convection yields up to 20% of the total rainfall and in some locations can reach 40%.

This result encourages the deployment of a specific observation device to better document this type of convection during the HyMeX campaign.

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