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Analysis of the observed and forecast rainfall intensity structure in a precipitation event

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During the last decades a number of studies have been devoted to examine the precipitation field temporal and spatial structure, given the fact that rainfall exhibits large variability at all scales (see for example Ceresetti et al. 2011, 2012). The objective of this study is to examine the rainfall field structure at high temporal (15 minute) and spatial (1 km) resolution. We focus on rainfall properties such as the intermittency using the auto-correlation of precipitation time series to assess if it can be modelled assuming a fractal behaviour and considering different scales. Based on the results and methodology used in previous studies applied to observational precipitation data such as raingauge, weather radar and disdrometer observations (see for example Molinié et al., 2011, 2013), in this case we employ high resolution numerical forecast data. In particular our approach considers using a transitive covariogram, given the limited number of samples available in single precipitation events.

Precipitation forecasts are derived at 15 minute intervals from 1-km grid length nested simulations of the non-hydrostatic mesoscale atmospheric model of the French research community Meso-NH, using AROME-WestMed model data as initial and boundary conditions. The analysis also considers existing data available in the Hymex (HYdrological cycle in the Mediterranean EXperiment) data base. Results are presented of a precipitation event that took place in the Rhône Valley (France) in November 2011. This case allows to study with the proposed methodology the effect of a number of factors (different orography along the Rhône Valley, turbulence, microphysical processes, etc.) on the observed and simulated precipitation field.

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