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Multi-scale evaluation of Mediterranean storm numerical Ensemble forecasting.

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During a heavy precipitation event, the distribution of rainfall intensities usually includes common and extreme values. To forecast river flow, hydrologists are mainly interested on average rainfall values over a catchment basin while hazard rainfall events are often due to extreme rainfall values. However, Ramos et al. (2005) have shown that the point rainfall intensity is not a robust indicator of the storm danger, the impacted surface and the rainfall duration must be taken into account.
In this presentation, we propose to assess the uncertainties of heavy precipitation ensemble forecasts in characterizing on one hand the overall rainfall and on the other hand the extreme one.
For overall rainfall, we use the scale dependent quality index defined and fully characterized in Yates et al. (2007). This index is defined as the correlation coefficient, between a reference and a simulated field, computed for different spatial resolutions, i.e. the surface of rainfall aggregation.
The extreme rainfall-forecast quality is assessed on the basis of severity diagrams (Ramos et al., 2005). These 3-dimensional diagrams display the rainfall return periods against the impacted surface area at different duration. For the application in a complex-relief region, a generalization of severity diagrams has been implemented in order to incorporate the regional behaviour of heavy rainfall events (Ceresetti et al., 2011).

Severity diagrams and scale dependant quality index are applied to simulated and observed rainfall fields for three major storms that occurred in the last decade over a Mountainous Mediterranean region of Southern France. It is shown that first severity diagrams allow to detect the critical space-time scales of rainfall events. Second, that severity diagrams provide a synthetic diagnostic of simulated fields. Both indexes demonstrate good capacities to highlight the differences in between members of ensemble simulations of the studied events.

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