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Predictability of severe rainfall events over Italy: importance of convective equilibrium

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During the year 2006 about 20 intense precipitation events occurred in Italy. The precipitation amount during these events has been measured by a dense network of more than 1700 raingauges covering the Italian peninsula. These events have been analyzed by comparing their modeled and observed spatio-temporal properties in order to gain a deeper understanding of their predictability.
Molini et al. (2009) introduced a procedure for classifying rainfall events as long-lived and spatially distributed or having a shorter duration and a minor spatial extent. The long-lived events are less affected by overall uncertainty than short-lived ones, although uncertainty of small-scale processes affects both types.
In this work we examine the hypothesis that the differences in predictability between these two classes of event are associated with different mechanisms of control of the precipitation by dynamical processes in the atmosphere. In particular, we ask whether the forcing of convection is sufficiently homogeneous and slowly varying that the convection can be considered to be in equilibrium (Done et al, 2006). Using ECMWF analysis of convective available potential energy (CAPE) and precipitation analysed from the rain gauge network, we calculate the magnitude and time evolution of the timescale of convective adjustment for some events individuated by Molini et al.(2009).
If the hypothesis is correct, the events with higher predictability will be associated with short convective adjustment timescales, which indicate equilibrium convection, while the short-lived, less predictable events will have long convective timescales.