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Conference on European Tornadoes and Severe Storms

Numerical simulation of heavy precipitation events in northern Italy

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Two cloud resolving model (CRM) simulations of flash flood events in northern Italy are presented. Examination of the circumstances leading to these floods suggest that the a surge of air from the Sahara desert drawn northward by approaching upper level trough moves over the marine Planetary Boundary Layer (PBL) of the Mediterranean where it becomes an elevated mixed layer (ELM). It then acts to cap the PBL allowing extreme Convective Available Potential Energy (CAPE) to build up as the flow races toward the Iberian Peninsula. Along the North Mediterranean coast, a barrier convergence zone, set up upwind of the ALPS barrier by the surging southerly flow, intersects the shoreline in the vicinity of Genoa, Italy. This convergence zone, combined with a modest topographical lift, acts to break the marine PBL inversion and release the extreme CAPE acquired as the air passed over the water. The flash floods that result produce upwards of 400 mm of rainfall in a 6-12 hour period.

The numerical simulations suggest that there is good potential for mesoscale prediction of these events, although precise placement is difficult. This is because the placement is not as strongly governed by the severity of the terrain as seems at first apparent. Because deep convection is occurring, triggered by local features, there is a strong dependence on PBL structures and flows which are affected by surrounding storms and local variations in SST, wind and so on.

Results of the Numerical simulations and sensitivity experiments so local forcing will be presented.