



Severe Weather Southern in Europe and Severe Flooding in Pakistan in August 2022: Linked Extreme Weather Events

Lance F. Bosart

University of Albany

Widespread severe weather occurred across southern Europe on 18 August 2022 in conjunction with a rare serial derecho. This derecho left a trail of destruction along a 1500+ km pathway between the French Island of Corsica northeastward to northern Italy and from there to Corsica, Austria, and Slovakia. The forward speed of the derecho exceeded 100 km/h. Reported measured wind gusts associated with this derecho included 225 km/h at Marignana, 206 km/h at L'Île-Rousse, and 197 km/h at Calvi. Several people were killed or injured. Widespread power outages and significant urban dislocation was reported along the derecho's pathway. This derecho was associated with an unusually strong summer 500-hPa cutoff cyclone that deepened southeastward across France into the western Mediterranean Sea and northern Italy. This cutoff cyclone subsequently turned northeastward and weakened as it moved toward central Europe on the western side of a strong blocking anticyclone situated over higher-latitude eastern Europe and western Russia. The weakening of the cutoff cyclone was unanticipated by the Hungarian National Meteorological Service and resulted in the firing of two top officials after forecasts of severe weather on Hungary's most important holiday did not materialize.

Meanwhile, on the eastern side of the aforementioned blocking anticyclone a parade of troughs that had crested this anticyclone dropped southeastward toward a persistent trough that was situated across eastern Iran, Afghanistan, Pakistan, and the Tibetan Plateau. A persistent quasi-stationary 700-hPa cutoff cyclone associated with this trough was located on the border of Pakistan and India. This cutoff cyclone facilitated a deep southwesterly flow that enabled the northeastward transport of very moist air (precipitable water values > 60 mm and integrated water vapor transport values > 1000 kg/m/s) across the Arabian Sea toward western India and Pakistan. Preliminary evidence suggests that the this moist southwesterly flow across the Arabian Sea was enhanced by a merger with a westward-directed equatorial flow of very moist air from the western tropical Pacific Ocean. Preliminary evidence also suggests that extraordinary heavy rains across Pakistan were associated more with duration than with rainfall intensity, given the large-scale stagnant "flow constipation" that persisted from eastern Europe to western Asia during much of August 2022. The key player in the aforementioned "flow constipation" stagnation was an unusually persistent, high-amplitude, quasi-stationary ridge centered over eastern Europe and western Russia.

Tuesday, 23 June 2024, 10:00AM

Refreshments 1:45PM

Please also join colleagues for refreshments and informal discussion after the seminar until 3:30pm

NCAR-Foothills Laboratory, 3450 Mitchell Lane

FL2-1022, Large Auditorium

Seminar will also be live webcast

<https://operations.ucar.edu/live-mmm>

Participants may ask questions during the seminar via Slido.