



The role of moisture advection from the North Atlantic basin to extreme precipitation events over the Western Mediterranean

Sven Ulbrich (1), Joaquim G. Pinto (1), Antonio Parodi (2), Roberto Rudari (2), Giorgio Boni (2), and Uwe Ulbrich (3)

(1) Institute for Geophysics and Meteorology, University of Cologne, Germany (sulbrich@meteo.uni-koeln.de), (2) CIMA Research Foundation, Savona, Italy, (3) Institute for Meteorology, Freie Universität Berlin, Germany

Large-scale meteorological conditions leading to hydrological extreme events over Northwest Italy are investigated. Using an extensive database of hourly rain gauge data, the most extreme events from 1948 until 2005 are identified and classified based on hydrological criteria: annual daily rainfall maxima exceed a defined threshold, previously calculated on the basis of a 2-components extreme value distribution. A hierarchical cluster analysis is applied to the rainfall annual maxima observed in the study area. Subsequently, the resulting clusters are evaluated with respect to associated weather patterns, cyclones, moisture advection and moisture sources. Results indicate that the strongest events are typically influenced the large-scale conditions over the North Atlantic/European sector and by considerable moisture advection from the North Atlantic Basin into the Western Mediterranean.

In particular, a significant part of moisture sources for two most extreme clusters is located over the central and eastern North Atlantic Ocean. For non-extreme events, moisture sources are typically located within the Mediterranean basin, with minimal contribution from the North Atlantic Basin. Therefore, we suggest that this additional moisture advected from the North Atlantic into the Mediterranean Basin plays a major role in the magnitude of the extreme precipitation events.