

Moisture transport in Mediterranean cyclones leading to extreme precipitation and flooding events

Jana Čampa, Ulrich Corsmeier and the HYMEX-team
Institute for Meteorology and Climate Research, KIT, Karlsruhe, Germany

Extreme weather events such as severe cyclogenesis with heavy precipitation and flash-flooding regularly affect the Mediterranean region. The orography surrounding the basin further enhances the formation of heavy rain. The aim of HyMeX (HYdrological cycle in the Mediterranean EXperiment) is a better understanding and quantification of the hydrological cycle and related processes in the region, focusing on high-impact weather.

In October and November 2012, during the Hymex SOP, a series of three Mediterranean cyclones reached the Gulf of Genoa and the Adriatic area bringing large amounts of moisture in this region. They caused extreme precipitation with peaks of up to 400 mm/24 h and severe flooding events with considerable damage and casualties. This study focuses on transport of moisture involved in heavy precipitation.

A Lagrangian trajectory analysis has shown large amounts of moist air arriving from the Atlantic, associated with a cyclone entering the Mediterranean from the Atlantic and later a large scale trough situated over western and central Europe. The most extreme precipitation occurred after the interaction of the moist air with the Alps and the Apennines. A combination of COSMO model simulations and trajectory analysis enables the distinction between advective and convective moisture transport.

The Lagrangian analysis of these events will be further extended by the analysis of the data collected during the Hymex SOP, such as radiosonde data, humidity measurements by aircraft, boundary layer balloons, microwave radiometer.