9th Alexander von Humboldt International Conference
Istanbul | Turkey | 24 – 28 March 2014
AvH9-14

Precipitation extremes in the Mediterranean, their climate-change scenarios and links to atmospheric circulation

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The study examines precipitation extremes over the Mediterranean region in an ensemble of 12 high-resolution regional climate model (RCM) simulations. Precipitation extremes are considered at a wide range of time scales from hourly to multi-day amounts and in individual seasons (DJF, MAM, JJA, SON). We find that the RCM simulations capture basic precipitation patterns for the recent climate (1961–90), including seasonal changes. Climate change scenarios for the late 21st century (2070–99) differ substantially for short-term (hourly) and multi-day precipitation extremes, mainly in the western Mediterranean. Projected increases in short-term extremes exceed those of daily and multi-day extremes, and occur even in regions and seasons in which mean precipitation is projected to decline. This change in the patterns of extreme precipitation may have important hydrological consequences, with increases in the severity of flash floods in a warmer climate in spite of the overall drying projected for the region. However, uncertainty of the scenarios of precipitation extremes related to within-ensemble variability is large. Consistency of the projected changes amongst the RCMs is highest in winter and lowest in summer, and generally it is higher for short-term than for multi-day extremes. The ability of the RCMs to capture links of the precipitation extremes to indices of atmospheric circulation, including the North Atlantic Oscillation (NAO), the Mediterranean Oscillation (MO) and the Western Mediterranean Oscillation (WeMO), is also evaluated. The role of the projected changes in the circulation indices in changes of precipitation characteristics over the Mediterranean is discussed.

Reference:
Kyselý J., Beguería S., Beranová R., Gaál L., López-Moreno J.I., 2012: Different patterns of climate change scenarios for short-term and multi-day precipitation extremes in the Mediterranean. Global and Planetary Change, 98–99, 63–72 [doi 10.1016/j.gloplacha.2012.06.010].