EMS Annual Meeting Abstracts
Vol. 14, EMS2017-554, 2017

Long-term evaluation of hydro-meteorological characteristics of European winters

Stephanie Hänsel (1,2), Andreas Hoy (1), Maurizio Maugeri (3), Michele Brunetti (4), Dominic Rumpf (5), and Jörg Matschullat (1)

(1) Interdisciplinary Environmental Research Center, TU Bergakademie Freiberg, Freiberg, Germany, (2) Deutscher Wetterdienst, Offenbach am Main, Germany (stephanie.haensel@dwd.de), (3) Department of Physics, Università degli Studi di Milano, Milan, Italy, (4) Institute of Atmospheric Sciences and Climate, National Research Council, Bologna, Italy, (5) Saxon State Agency for Environment, Agriculture and Geology, Dresden, Germany

Rising Earth surface temperatures are influencing the global water cycle and thus regional precipitation characteristics. Besides changes in average precipitation, variations in frequency and intensity of heavy precipitation events as well as drought conditions are of great interest for manifold societal and economical activities. While the adverse impacts of heavy precipitation events and droughts are often more severe during the summer half year, the magnitude of summer drought conditions is often influenced by precipitation characteristics during the winter half year. Furthermore, winter flood risks may increase, as warmer winter temperatures increase potential evapotranspiration, change the composition of precipitation (liquid vs. solid) and thus alter hydrological storage conditions.

This contribution studies long-term changes in precipitation conditions over Europe and several sub-regions using different precipitation and drought indices at monthly and daily timescales. Most of the precipitation and temperature records cover the 20th Century; some even date back to the 19th Century. Homogenized data are used, wherever possible, helping to evaluate variations in data series of unclear quality.

The analyses show a pronounced regional differentiation and a slight increase in precipitation totals in many sub-regions over the last 20–30 years. Heavy precipitation events occurred more frequently in recent time, while the number of dry days decreased. Nonetheless, there is still potential for long-lasting dry periods that often extent from autumn into winter, being relevant, e.g., for winter crops. The general influence of temperature (and evaporation) on the evaluation of winter drought conditions is rising.