

Analyzing spring conditions prior to droughts and heatwaves in Europe

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Extremely hot and dry summer periods in mid-latitude regions have (large) negative impacts on human health (e.g. Germany and France 2003), lead to serious harvest damages in agriculture as well as to forest fires (e.g. Russia 2010). An early prediction of such extreme periods (e.g. one month in advance) would enable people to prepare accordingly and to arrange precautionary measures.

An analysis of the surface solar irradiance, precipitation and soil moisture in Germany and adjacent areas for the period 1958 – 2005 suggests that summers with an over-average amount of solar radiation and serious droughts often follow after springs with above-average solar radiation and below-average soil moisture conditions and precipitation. For the analysis solar radiation data derived from geostationary satellite observations were supplemented with data from ERA-40. In addition, soil moisture data from ERA-40 and ERA-interim, and precipitation data from ERA-40, ERA-interim, and GPCC are used.

The analysis reveals several interesting connections between the conditions in spring and in summer in the period under investigation, which might lead to a method of forecasting extremely hot and dry summers in Europe based on observations.