



Soil moisture anomalies during the Russian heat wave of 2010

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During the Russian heat wave of 2010, a persistent pressure ridge occurred due to a blocking event in the northern hemisphere jet stream. The possible respective contributions of atmospheric circulation anomalies, soil moisture feedbacks, and further effects have not been quantified so far. The combination of atmospheric blocking conditions and preceding negative soil moisture anomalies has already been associated with heat waves in the past, e.g. in the case of the 2003 European heat wave. In addition, Fischer et al. (2007) have shown a possible influence of soil moisture on geopotential height with modeling experiments. More recently, Hirschi et al. (2011) have demonstrated a relationship between precipitation deficits and temperature extremes in Southeastern Europe, based on 40-year time series.

In the present analyses of the Russian heat wave and drought, we focus on soil moisture anomalies during and preceding the heat wave, and on their possible contribution to the heat wave development. In the total terrestrial water storage anomalies retrieved from the Gravity Recovery and Climate Experiment (GRACE) satellites, we find that a negative anomaly was already present in the preceding winter months in the region of western Russia where the strongest heating occurred. Positive temperature anomalies developed later over this region and reached a maximum in July, whereas the drought lasted longer. These results are compared with analyses from other data sources.

References:

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