Geophysical Research Abstracts
Vol. 15, EGU2013-9657, 2013
EGU General Assembly 2013

Soil moisture-temperature coupling: revisited using remote sensing soil moisture

Martin Hirschi (1), Brigitte Mueller (1), Wouter Dorigo (2), and Sonia I. Seneviratne (1)

(1) Institute for Atmospheric and Climate Science, ETH Zurich, Zürich, Switzerland (martin.hirschi@env.ethz.ch), (2) Department for Geodesy and Geoinformation, Vienna University of Technology, Vienna, Austria

Hot extremes have been shown to be induced by antecedent soil moisture deficits and drought conditions in several regions (e.g., Mueller and Seneviratne, 2012). While most previous studies on this topic relied on modeling results or precipitation-based soil moisture information (in particular the standardized precipitation index, SPI), we use here a new merged remote sensing (RS) soil moisture product combining data from active and passive microwave sensors to investigate the relation between the number of hot days (NHD) and preceding soil moisture deficits.

Overall, the global patterns of soil moisture-NHD correlations from RS data and from SPI as used in previous studies agree relatively well, suggesting that these patterns are partly independent of the chosen dataset. Nonetheless, the strength of the relationship appears underestimated with RS-based soil mois- ture data compared to SPI-based estimates, in particular in previously iden- tified regions of strong soil moisture-temperature coupling. This is mainly due to the fact that the temporal hydrological variability is less pronounced in the RS data than the SPI estimates in these regions, and that pronounced (dry or wet) anomalies appear underestimated. Further, complementary anal- yses with data from the Global Land Data Assimilation System (GLDAS) suggest that the differences between the RS-based soil moisture-NHD and the precipitation-based SPI-NHD coupling estimates are not primarily due to the use of soil moisture instead of SPI, or to the shallow depth of the RS- based soil moisture retrievals.

Mueller, B., and S. I. Seneviratne (2012). Hot days induced by precipitation deficits at the global scale. Proceedings of the National Academy of Sciences, doi: 10.1073/pnas.1204330109.