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A study of soil moisture climate feedbacks and its effects on climate projections (GLACE/CMIP5)

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The earth system model EC-Earth (v2.3) has been employed to study the feed back of changes in soil moisture. This has been done in context with the GLACE-CMIP5 project which is a global-scale multi-model experiment investigating the impact of soil moisture-climate interactions in CMIP5 projections.

It is found in the multi-model GLACE-CMIP5 ensemble (Seneviratne et al.‡), submitted) that the projected changes onto the climate for the period 2070 to 2100 are seen most clearly in the extremes of daily maximum temperature while the effects on mean temperature are less pronounced. The changes are mostly driven by projected decreases in soil moisture during the respective summer months in either hemisphere due to changes in precipitation and land hydrology.

A clear correlation is found in the simulations between soil moisture-induced changes in evaporative cooling and resulting changes in temperature. Effects on precipitation have also been observed which tend to be stronger for the northern hemisphere as well as for the occurrence of anomalies rather than changes to mean precipitation values.

The main findings have recently been described in Seneviratne et al.‡), while this presentation discusses additional results from the Lund group, some of which could not be completed in time for the publication, and puts these into context with the main findings from the multi-model study.

References: ‡) "Impact of soil moisture-climate feedbacks on CMIP5 projections: First results from
the GLACE-CMIP5 experiment", Sonia I. Seneviratne1, Micah Wilhelm, Tanja Stanelle, Bart van den Hurk, Stefan Hagemann, Alexis Berg, Frederique Cheruy, Matthew E. Higgins, Arndt Meier, Victor Brovkin, Martin Claussen, Jean-Louis Dufresne, Kirsten Findell, David M. Lawrence, Sergey Malyshev, and Ben Smith, submitted to Geophys. Res. Let., July 2012.