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The Earth radiation balance as driver of the global hydrological cycle

Martin Wild (1), Beate Liepert (2), and Christoph Schaer (1)

(1) ETH Zurich, Institute for Atmospheric and Climate Science ETH, Zurich, Switzerland (martin.wild@env.ethz.ch), (2) NorthWest Research Associates, 4118 148th Ave NE, Redmond, WA 980452, USA

This study emphasizes the prominent role of the surface radiation balance as a key determinant of the intensity of the global hydrological cycle. There are indications that the surface radiation balance underwent significant decadal variations during the 20th century, which are reflected in the variations of the intensity of the global hydrological cycle. We point out that the current generation of climate models does not show such strong variability in either of these quantities. Here we advocate the inadequate representation of surface solar dimming and brightening as a potential cause of these deficiencies in the simulation of decadal variations in precipitation and the intensity of the hydrological cycle. This is further supported by the recent evidence that solar forcings are more effective in altering the intensity of the global hydrological cycle than their thermal (greenhouse-gas-forced) counterparts. Improved knowledge of variations of the components of the surface radiation balance as well as their underlying forcing factors are therefore key to our understanding of past, present and future variations in the intensity of the hydrological cycle.

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