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The contrasting role of forests and grassland on land-climate interaction during recent European heat waves

Ryan Teuling (1,2), Sonia Seneviratne (1), Reto Stockli (3), Markus Reichstein (4), Eddy Moors (5), Bart van den Hurk (6), Philippe Ciais (7), and Sebastiaan Luyssaert (8)

(1) ETH Zurich, IAC, Zurich, Switzerland (ryan.teuling@env.ethz.ch; sonia.seneviratne@env.ethz.ch), (2) Department of Environmental Sciences, Wageningen University, The Netherlands, (3) MeteoSwiss, Zurich, Switzerland, (4) Max-Planck Institute for Biogeochemistry, Jena, Germany, (5) Alterra, Wageningen, The Netherlands, (6) KNMI, De Bilt, The Netherlands, (7) Laboratoire des Sciences du Climat et de l'Environnement, LSCE, Gif-sur-Yvette, France, (8) Department of Biology, University of Antwerp, Belgium

Recent European heat waves have raised the interest in the impact of land conditions, in particular soil moisture, on temperature extremes. Here we show that observations from an extensive network of flux towers reveal a contrasting response of forests and grasses in their water and energy budgets to heat waves. On the short term, forests primarily increase the sensible heat flux into the atmosphere in response to increased available energy at the land surface, in contrast to grasses that show only elevated latent heating. On the long-term, this elevated latent heating accelerates depletion of soil moisture, and the system switches into a new equilibrium in which grasses surpass forests as the major source of sensible heat. Satellite observations of land surface temperature during past heat waves are consistent with this hypothesis.