



## **Drier Mediterranean Soils due to Greenhouse Warming bring easterly Winds over Summertime Central Europe**

R.J. Haarsma, F.M. Selten, B. vd Hurk, W. Hazeleger, and X. Wang  
KNMI, Research, De Bilt, Netherlands (haarsma@knmi.nl)

A robust result of greenhouse warming runs with global climate models is the depletion of soil moisture in southern and central Europe in summer. This leads to a strong increase in surface temperatures as a result of the accompanying reduction of the surface cooling by evaporation. Analyses of simulations with the ECHAM5/OMI and EC-EARTH global climate models demonstrate that this causes a large-scale heat low response in the lower atmosphere. At its northern flank this brings easterly winds over Central Europe. A statistical analyses of a large ensemble made by the ECHAM5/OMI model indicates that the same mechanism operates on intra-seasonal time scales: a weak relationship is found between dry Mediterranean soils in June and low surface pressure in July-August. The dry soils are related to reduced rainfall in January-May. This applies for intra-seasonal time scales as well as for climate change due to greenhouse warming. Additional idealized simulations confirm the relationship between large surface warming and the development of a heat low. This induces a positive feedback: dryer Mediterranean soils in summer bring easterly winds over Europe increasing the continental character of Western Europe summer climate.