



On the use of the forced sensitivity method in climate studies

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Assessing future weather requires an estimate of the influence of internal climate variability, including the ability to identify and quantify feedback processes between atmospheric dynamics and its boundary conditions. Using KNMI's state-of-the-art global earth-system model, EC-Earth, which is based on ECMWF's Seasonal Forecasting System, it is possible to do this for the first time in a dynamically consistent way.

Dynamical consistency is ensured by the application of a forced sensitivity technique, recently developed at ECMWF, which produces optimal model tendency perturbations. These are determined under the requirement that they force the model to reproduce, on average, a prescribed circulation change, leaving the synoptic scale free to interact with and adjust to the large-scale circulation.

We present results of a study on weather characteristics of a possible climate in 2050 with a persistent westerly circulation in winter and a persistent easterly circulation in summer, which were obtained using the forced sensitivity technique. Additionally, climatological interesting years are reproduced, such as the exceedingly hot summer of 2003, under 2050 conditions.

Results for these simulations are presented as well.