



A CMIP5 model inter-comparison of radiative climate change feedbacks

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A quantification of climate change feedbacks in different CMIP5 models is presented based on a partial radiative perturbation (PRP) analysis. The radiation code used in the PRP computation is derived from the atmospheric circulation model ECHAM6. The application of a single radiative transfer scheme for all models allows for a consistent comparison of feedbacks across the different models.

Furthermore, the PRP method is compared to the feedback computation relying on radiative kernels.

The reasons for different model responses to increased levels of carbon dioxide concentrations are investigated with a particular focus on the possible role of fast tropospheric adjustment processes. Results from atmosphere-only experiments with fixed sea surface temperatures are used to compare the behavior of the different models. This allows for better characterizing the physical process involved in fast tropospheric adjustment, and to examine if the fast mechanisms relate to the strength of the temperature dependent feedbacks on longer time scales.