



Conceptual Understanding of the Climate Change Pattern with a Simple Model

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The future climate change projections of the IPCC AR4 are based on GCM simulations, which give a distinct global warming pattern, with an arctic winter amplification, an equilibrium land sea contrast and an inter-hemispheric warming gradient. While these simulations are the most important tool of the IPCC predictions, the conceptual understanding of these predicted structures of climate change are very difficult to reach if only based on these highly complex GCM simulations.

In the study presented here we will introduce a very simple model based on strongly simplified physical processes, which is capable of simulating the main characteristics of global warming. The model shall give a bridge between the 1-dimensional energy balance models and the fully coupled 4-dimensional complex GCMs. The simple model's climate sensitivity and the spatial structure of the warming pattern is within the uncertainties of the IPCC AR4 models simulations. It is capable of simulating the arctic winter amplification, the equilibrium land sea contrast and the inter-hemispheric warming gradient with good agreement to the IPCC AR4 models in amplitude and structure. The presentation will discuss the feedbacks and processes causing these structures, as estimated from the deconstruction of feedbacks and processes in the simple model.