Geophysical Research Abstracts
Vol. 13, EGU2011-6990, 2011
EGU General Assembly 2011
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# Arctic amplified climate response to albedo, cloud and water vapor radiative feedbacks in a global climate model

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We study the response of the climate system to the albedo-, cloud- and water vapor feedbacks in a slab-ocean version of the global climate model ECHAM 6.0 forced by a doubling of CO2. The model includes continents, sea ice and a mixed-layer ocean with fixed ocean heat transport. Feedbacks are studied with an improved version of the 'online method' used since the 1970's to study climate feedbacks by taking advantage of the vast improvements in computational resources. Relevant fields from standard simulations are stored at every radiation call, and subsequently read into the model in new runs with fixed feedbacks. With three feedbacks and two external CO2 forcings, this results in 16 different runs with all combinations. Most importantly, the improved method allows a better separation of the temperature response to the radiative feedbacks, relative to previous studies which fixed single feedbacks in isolation. It is found that, while globally the water vapor feedback is by far most important in determining ECHAM 6.0 global climate sensitivity, all three feedbacks do contribute to Arctic amplification of climate change. The seasonal, regional and vertical structure of the response to individual feedbacks is studied and put into perspective with the observed recent changes.