Geophysical Research Abstracts, Vol. 9, 10038, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10038

The influence of a different sea ice and snow albedo on the northern hemisphere on sea ice cover and atmospheric circulation: A model study

A. Benkel (1), B. Rockel (1)

Institute for Coastal Research, GKSS Research Centre, Germany

(andreas.benkel@gkss.de / Fax: +49 4152 87 1888 / Phone: +49 4152 87 1882)

Model simulations project an amplification of global warming in the Arctic and also an almost ice-free Arctic Ocean in summer by the end of the 21^{st} century. The surface-albedo-feedback plays a contributing role in the processes involved in these changes.

To study the effect of a snow and sea ice albedo parameterisation that is changed on the northern hemisphere (NH) explicitly, simulations with the coupled general circulation model ECHO-G were performed. Simulations with the original albedo schemes were compared to those using a set of newer ones.

As an effect of the changed snow and sea albedo, the sea ice volume and the near surface air temperature gradient between equator and the North Pole increased. The effect on sea ice cover as well as on the meridional temperature gradient was greatest in autumn. Largest circulation changes occurred in early spring and included a shift of the polarity of the Arctic Oscillation (AO) towards its low index state. This was accompanied by a pronounced warming of the Arctic stratosphere. In March and April changes in the zonally averaged zonal wind speed occurred also over the southern hemisphere. These changes were symmetric at the equator to those changes on the NH. In spite of the increased NH sea ice volume, in late winter and early spring also the sea ice cover around Greenland decreased as a result of the changed atmospheric circulation.

Although the new albedo parameterisation led to a changed sea ice cover (including an annual cycle that matches observations better and a changed mean state sea ice cover and volume), the new parameterisation did not change the strength of the polar

amplification of global warming.