Geophysical Research Abstracts,
Vol. 11, EGU2009-2486, 2009
EGU General Assembly 2009

Study of the surface albedo of the ice-covered Weddell and Bellingshausen Sea

A. Weiss, J. King, T. Lachlan-Cope, and R. Ladkin
British Antarctic Survey, British Antarctic Survey, Cambridge, (aiw@bas.ac.uk)

Sea ice has a major influence on the energy and radiation budget of the maritime atmospheric boundary layer, because it insulates the water surface from direct contact with the atmosphere and varies the sea surface albedo. In this study we investigate the surface albedo of the sea ice zone around the Antarctic Peninsula. For this purpose, we utilize aircraft measurements of sea surface and atmospheric parameters. The data is set based on observations conducted in the West Antarctic sea ice zone in the austral summer seasons 2007 and 2008. The sea surface albedo shows significant regional differences along with the sea ice and atmospheric conditions. We observed the smallest albedo values over newly formed ice in polynyas and nilas and the largest albedo values over snow-covered pack ice. The ice-covered sea surface is often a mixture of different sea ice types or thicknesses. For characteristic sea ice covers we determined effective albedo values. In the Bellingshausen Sea the median effective albedo of first year sea ice was 0.63, in the Weddell Sea of pack ice with leads 0.78 and of new, young ice 0.41. In many models the sea surface albedo is parameterized in a relatively simplified manner by using a constant albedo value or by using a parameterization, which assumes that the sea ice albedo depends inversely only on the surface or air temperature. Such albedo-temperature parameterizations are applied in global circulation models like the UK GCM, described by Ingram (1989), in thermodynamic sea ice models, e.g. as described by Ross and Walsh (1987), or in climate models like the ECHAM 5, described by Roeckner et al. (2003). In general our data verify an inverse relation between albedo and temperature. In order to investigate how accurately such parameterization could simulate the sea surface albedo of the West Antarctic sea ice zone, and which parameterization is most appropriate for certain sea ice areas, we forced commonly-used albedo-temperature parameterizations with temperature observations. The comparison of the simulated albedo values with observations shows that large biases occur for certain sea ice regions.