Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11124, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11124
EGU General Assembly 2008

Nonliner processes of heat and momentum exchange between atmosphere and surface in the Arctic

I.A.Repina (1)

(1) A.M. Obukhov Institute for Atmospheric Physics, Moscow, Russia

Together with radiation processes an important role in formation of heat conditions in snow-ice cover and overlaying air play the processes of turbulent heat and mass transport. Correct description of these processes is essential for large scale and regional coupled numerical models. Numerous studies of these processes on the basis of ship based observations above ice cover, open water, marginal ice zone and surfaces covered by ice with various properties have been done. Several models have been developed to simulate and parameterize these processes. The main objective of present work to study processes and feedbacks which govern radiation and heat conditions over ice-snow covered surfaces and in the atmospheric layer above. Turbulent heat and mass exchange in the polar regions is very complex due to rather complex topography and structure of the underlaying surface. The dependence of the heat and momentum exchange on the type of the underlying surface has been studied for Antarctic and Arctic regions. On the basis of the turbulent measurement in Russian Antarctic Expeditions and expedition Arctic-98 and Arctic-2000 the tables are drawn up for the values of the exchange coefficients in the bulk formulas, the surface roughness parameter, and the drag coefficient in respect to the type of the underlying surface in this regions. The wind speed dependence of this parameters is studied. As well as the thermal structure different type of ice is considered. Transformation of air flow caused by change of the underlaying surface type is also considered. Several analytical solutions were also used. The attempt of a theoretical estimation of influence of ridges hummock on structure of an air flow is undertaken on the basis of system of equations describing variability of an air flow above a non-uniform surface. The results of modeling confirm the necessity of proper account for processes occurring in the atmospheric layer

over ice and snow-covered surfaces.