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The roughness parameter snow and sea ice in different conditions

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The coefficient of aerodynamic drag of the underlying surface and the related roughness parameter are the most important aerodynamic surface characteristics, which are needed in calculating the drift of ice fields, in forecasting the ice conditions, and in calculating the ice pressure on vessels and shore constructions. The Drag coefficient for an ice surface depends, to a great extent, on the form, geometric sizes, and disposition of its roughness (wind-weathered ridges of snow and hummocks). Moreover, the drag of an ice surface depends on the state of its snow cover, on the presence of drifting snow and snowfalls, and on the near-surface stratification. Therefore, both the drag coefficient and the arctic ice roughness parameter prove to vary in time and in space according to the meteorological characteristics and the distribution of hummock zones and debacles. This work is based on the data a number of polar experiments in Arctic in Antarctic regions. The main results are: determination the effects of structural and thermal non-uniformity on the ice covered surface on heat and momentum exchange between the atmosphere and the underlaying surface; investigation the air flow transformation caused by change of the underlaying surface type (ice - open water, fast ice - thin one-year ice, glassier - sea); determination the values of the exchange coefficient in the aerodynamic bulk formulas and the surface roughness parameter in respect to the type of the surface and meteorological conditions in the polar regions. The results of roughness parameter calculation above different type of surface are discussed. The special attention is given to cases of ice breaks presence, local changes of its structure. The given work confirms necessity of realization of target experiments on research of interaction of an atmosphere with a spreading surface in polar areas. The results of modeling, basically, well describe processes occurring in surface layer of an atmosphere is necessary by ice and snow. The work was supported by RFBR (grant ź 05-05-64235)