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Direct measurements of sea surface drag coefficient in different conditions

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The coefficient of aerodynamic drag of the underlying surface Cd and the related roughness parameter z0 are the most important aerodynamic surface characteristics. The principal results from shipboard measurements were the estimation of surface momentum flux from direct eddy correlation measurements using newly modified shipboard instrument complex. The results are based on measurements obtained during summer and fall time in the Barents sea for wind speed between 1 and 25 m s-1. The drag coefficient was computed directly from the friction velocity and mean wind velocity measurements. For wind speeds between 4 and 20 m s-1, Cd increases roughly linearly with wind speed. Additional variability in Cd is due to wave age and swell. The effect of wave age is to increase the drag in fetch- or duration-limited conditions. Reduction of sea surface drag coefficient at high wind condition was observed. Probably it is connected with sea drop effect. We have got increasing Drag coefficient values in coastal zone during coast winds action. The knowledge about ice Drag coefficient 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 coefficient Cd 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. In order to consider the effect of different ice conditions on the momentum exchange between atmosphere and ocean a parameterization for variable drag coefficients is introduced. A square dependence on ice concentration is combined with a linear dependence on deformation energy to account for the influence of floe edges as well as for roughness elements in regions with a more compact ice cover.