

Marine slicks associated with coastal currents

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Field studies of slick bands on the sea surface were carried out in the coastal zone of the Black Sea for better understanding of the relation between marine slicks and non uniform currents. The current velocity profiles were measured from a boat using a 600-kHz acoustic Doppler current meter (ADCP). Additionally, current velocities in the thin upper water layer (about 5 mm thickness) were measured when recording trajectories of special surface floats with GPS receivers. Samples of surfactant films inside/outside the slicks were collected using a net method, and the films were characterized when studying in laboratory the action of collected films on characteristics of gravity-capillary waves. The slick bands were also detected in the Envisat SAR imagery. The slick bands were shown to be characterized by the accumulation of surfactants, and to be oriented along the coastal currents and approximately along the bottom topography slope. The slick bands in accordance with theory were located in the areas of convergency of weak transverse current components, marking the non uniformity of the currents in the upper layers. In particular, results of two case studies are presented demonstrating slick bands formation in the zone of merging of two surface currents of slightly different directions, and in the zone where a bottom current below a thermocline changed its direction when meeting the bottom slope. This work was supported by INTAS (Projects MOPED, DEMOSSS), the Russian Foundation of Basic Research (Projects 08-05-00634, 08-05-97011), and RAS (Program “Radiophysics”).