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Drift Response of Monomolecular Slicks to Wave and Wind Action

Philipp Lange and Heinrich Hühnerfuss

University of Hamburg, Federal Republic of Germany

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ABSTRACT

The drift responses of monomolecular slicks to wind and wave action have been investigated in a laboratory wind-wave tunnel and in the field. The wind-wave tunnel was fitted with a mechanical wave generator which produced uniform long-crested gravity waves. The field studies were performed off the island of Sylt (German Bight) in the North Sea.

Laboratory results for the slick drift response to deep water gravity waves only were in excellent agreement with the Stokes irrotational mass transport drift velocity theory. The purely wind-induced slick drift was in good agreement with the results obtained by previous investigators using a variety of other floats. A number of laboratory and field investigations have been compared which show that the surface drift to wind speed ratio lies between 2.6–5.5%. A difference between the average ratios for the collected laboratory and field results indicates that the pure gravity wave drift component probably comprises 25–30% of the total surface drift. A qualitative example confirming this is demonstrated in the field studies.

A laboratory treatment of the combined wind and wave slick drift showed that the effects of wind and waves cannot be simply superimposed. In some cases the gravity waves appear to decouple the wind drift, especially at lower wind speeds.

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Headquarters: 45 Beacon Street Boston, MA 02108-3693

DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826

amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718

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