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Herder-Induced Contraction and Fragmentation of Floating Crude Oil Slicks. ALI ALSHAMRANI, DAVID MURPHY , University of South Florida — Crude oil spills often form harmful oil slicks on the sea surface. Chemical herders may be used to contract slicks for subsequent burning or collection and are an important oil spill treatment tool, especially in cold and remote ice-infested waters in the Arctic. However, the fluid mechanics of oil slick contraction and fragmentation in the presence of obstacles (e.g. floating ice) is not well understood. Here we present controlled laboratory experiments investigating the contraction of Alaska North Slope crude oil slicks under the influence of the chemical herder OP-40 (Siltech). A 100 m thick oil slick is created in a basin (924220 cm) of chilled water (˜5C) within a fume hood and is subjected to the controlled release of herder from a rectangular ring pneumatically lifted from the water surface at one edge of the basin. The resulting oil slick contraction across the basin is visualized using a high speed camera, and slick contraction speed, area, and thickness are calculated over time. Oil slick fragmentation and retention by obstacles simulating sea ice also are tested by placing 3D-printed objects of various shapes and sizes in the basin. Maximum oil slick edge contraction speeds sharply decrease from ˜0.2 m/s over 1 min as the slick thickness increases up to ˜1 mm.

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