

Abstract Submitted
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Effect of adding dispersant on the structures of water-in-oil emulsions.¹ DIEGO F. MURIEL, JOSEPH KATZ, Johns Hopkins University — It is believed that dispersant application to break up marine oil slicks is effective only before stable water-in-oil emulsions develop. Both breaking waves and gentle mixing produce stable emulsions, and surfactants present in crude oil stabilize entrained sea water even in calm seas. Once formed, the interaction of these emulsions with chemical dispersant is poorly understood, partially because field observation at microscopic scales is challenging. This study examines the effect of adding dispersant (Corexit 9500) on the structure of emulsions with or without external mechanical energy. Microscopic imaging examines the size, spatial distribution, and time evolution of water droplets in the emulsion prior to and after introducing dispersant. Initially, these droplets form a multi-scale lattice with small droplets aggregating around large ones. Adding dispersant without mixing generates secondary flows as the water droplets coalesce. In time, part of the water separates, a fraction forms a cloud of submicron droplets, and the rest remains unchanged. Agitating the dispersant-emulsion mixture enhances the phase separation, removing about 66% of the entrained water, and leaving an emulsion with finer droplets with different rheological properties (higher viscosity).

¹MPRI. Multi Partnership Research Initiative, Canada.

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