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Large Scale Behavior and Droplet Size Distributions in Crude Oil Jets and Plumes[1] JOSEPH KATZ, DAVID MURPHY, DAVID MORRA, Johns Hopkins University — The 2010 *Deepwater Horizon* blowout introduced several million barrels of crude oil into the Gulf of Mexico. Injected initially as a turbulent jet containing crude oil and gas, the spill caused formation of a subsurface plume stretching for tens of miles. The behavior of such buoyant multiphase plumes depends on several factors, such as the oil droplet and bubble size distributions, current speed, and ambient stratification. While large droplets quickly rise to the surface, fine ones together with entrained seawater form intrusion layers. Many elements of the physics of droplet formation by an immiscible turbulent jet and their resulting size distribution have not been elucidated, but are known to be significantly influenced by the addition of dispersants, which vary the Weber Number by orders of magnitude. We present experimental high speed visualizations of turbulent jets of sweet petroleum crude oil (MC 252) premixed with Corexit 9500A dispersant at various dispersant to oil ratios. Observations were conducted in a 0.9 m x 0.9 m x 2.5 m towing tank, where large-scale behavior of the jet, both stationary and towed at various speeds to simulate cross-flow, have been recorded at high speed. Preliminary data on oil droplet size and spatial distributions were also measured using a videoscope and pulsed light sheet.

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