LETTER

# REPLY TO PRINCE ET AL.: Ability of chemical dispersants to reduce oil spill impacts remains unclear

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Chemical dispersants are applied to oil-contaminated areas as a primary response to oceanic oil spills. The impacts of dispersants on microbial community composition and activity, particularly hydrocarbon turnover, are debated. Kleindienst et al. (1) demonstrated that Corexit 9500, a dispersant, can suppress the activity of oil-degrading microorganisms. Chemically enhanced water-accommodated fractions (CEWAFs) were used for these experiments because the deepwater plume that formed following the *Deepwater Horizon* (DWH) blowout consisted of the water-accommodated fraction: Roughly half of the discharged oil, along with dispersants applied at the wellhead, was entrained in the deepwater plume (2). Using CEWAFs assured an appropriate simulation of the DWH plume chemistry. Prince et al. (3) claim that the method used to produce CEWAFs would leave most of the added oil floating atop the surface in the bottles. Kleindienst et al. (1) followed standardized methods to produce CEWAFs, and only the dispersed oil fraction was used; no floating oil was present in the experiments (1).

The studies by Kleindienst et al. (1) and Prince et al. (4) revealed opposite effects of dispersants on oil biodegradation, but the results are not directly comparable. Prince et al. (4) used New Jersey shore near-surface seawater and Alaska North Slope crude, whereas Kleindienst et al. (1) used Gulf of Mexico deepwater and Macondo surrogate oil. Moreover, the two studies used a different procedure for oil and dispersant amendments. Kleindienst et al. (1) optimally simulated the physical and chemical conditions of the DWH plume, whereas Prince et al. (4) added oil or dispersant or dispersed oil directly to samples, which were then mixed with a stir-bar over a 60-d incubation. Prince et al. (3) claimed comparing dispersed oil and a floating oil would be a better comparison. However, Kleindienst et al. (1) focused on deepwater oil dynamics, and because the deepwater plume contained only dissolved oil, the use of CEWAFs was essential. The results of Kleindienst et al. (1) are highly relevant to open ocean oil spill scenarios like the DWH, where dispersant was added directly to the discharging blown-out wellhead. Additionally, Kleindienst et al. (1) addressed the impacts of dispersants on microbial hydrocarbon turnover in surface water contaminated with oil from the sunken Taylor Energy oil platform. Those findings corroborated the deepwater microcosm results: Dispersants inhibited hydrocarbon turnover.

Prince et al. (3) stated that successful dispersant application would transfer all floating slick into the water column. In real-world scenarios, dispersant applications are not that efficient, as evidenced by the large amount of oil that remained on the surface during the DWH incident. Furthermore, chemically dispersed oil can still pollute coastlines and is more toxic to a variety of marine life forms than dispersed oil. Prince et al. (3) further claimed that dispersants exert only short-term impacts, but dispersants were still found in Gulf habitats ~4 y later (5). Because dispersants can slow microbial oil biodegradation and persist long term in the environment, challenges remain to fully understand their efficacy in a range of oil spill scenarios.

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The authors declare no conflict of interest.

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