

Oil dispersants do facilitate biodegradation of spilled oil

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Kleindienst et al. (1) question whether dispersants stimulated biodegradation following the Macondo oil release in the Gulf of Mexico, but, in fact, their experimental design illustrates why dispersants play such an essential role in oil spill response. Their method of producing “water accommodated fractions,” although routinely used for toxicity tests, leaves the vast majority of the oil they add floating on the surface of their experiment. This does not happen at sea. Dispersants lower the interfacial tension between oil and water, allowing minor turbulence to generate small droplets that diffuse apart and remain entrained in the water column. Successful dispersant applications transfer essentially all of a floating slick into the water column, where the oil dilutes to a sub-parts per million level in days (2).

In reasonable agreement with other work (e.g., 3–5), Kleindienst et al. (1) demonstrate that the biodegradation of the hydrocarbon components of dispersed oil is rapid (time frame of days to weeks), although unlike our work (4), they find that dispersants slow degradation by a factor of ~2. However, the relevant comparison is not between dispersed oil with and without dispersant (responders do not apply dispersant to oil that would disperse naturally), but between dispersed oil and a floating slick (5), or with beached oil when the undispersed slick eventually arrives at a shoreline. The biodegradation of that oil is substantially slower, with potential life times measured in months to years. Although dispersants may have short-term debits, their enormous benefit is the dramatically shortened residence time of dispersed oil in the environment and the removal of oil from the water’s surface.

- 1 Kleindienst S, et al. (2015) Chemical dispersants can suppress the activity of natural oil-degrading microorganisms. *Proc Natl Acad Sci USA* 112(48):14900–14905.
- 2 Bejarano AC, Levine E, Mearns AJ (2013) Effectiveness and potential ecological effects of offshore surface dispersant use during the Deepwater Horizon oil spill: A retrospective analysis of monitoring data. *Environ Monit Assess* 185(12):10281–10295.
- 3 Hazen TC, et al. (2010) Deep-sea oil plume enriches indigenous oil-degrading bacteria. *Science* 330(6001):204–208.
- 4 Prince RC, et al. (2013) The primary biodegradation of dispersed crude oil in the sea. *Chemosphere* 90(2):521–526.
- 5 Prince RC, Butler JD (2014) A protocol for assessing the effectiveness of oil spill dispersants in stimulating the biodegradation of oil. *Environ Sci Pollut Res Int* 21(16):9506–9510.

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