A biogenic input of heptadecane in surface waters prior to and during the Anthropocene

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During a summer 2015 expedition to the Gulf of Mexico to study weathering of natural oil seeps, we were 'fooled' visually from the bridge of the R/V *Atlantis* on several occasions by slicks that were not petroleum derived. Rather, they were blooms of *Trichodesmium* with a hydrocarbon content entirely comprised of heptadecane with traces of pentadecane. Moreover, these biogenic hydrocarbons were sufficiently pervasive to leave an overprint in slicks derived from natural seeps.

These findings were timely as they coincided with Lea-Smith et al. [1] who used laboratory cultures to study the global-scale production of pentadecane, heptadecane, and heptadecene by *Prochlorococcus* and *Synechococcus*. By scaling the fractional yield of alkanes produced in their cultures to the global productivity of both genera, Lea-Smith et al. [1] calculated annual global-scale hydrocarbon production of ~ 308–771 million tons. Even if the estimates of Lea-Smith *et al*. are overblown by a factor of 10, this yield would provide the ocean with a hydrocarbon input ~100–fold greater than the combined inputs of oil spills and natural oil seeps. Lea-Smith et al. argued that this production was balanced by microbes and proposed that this short-term cycle primes the ocean's microbiome to manage hydrocarbon influxes from spills and seeps [2].

These findings from the field and laboratory indicate the input of hydrocarbons by cyanobacteria provides an additional input term prior to and continuing through the Anthropocene and warrants additional studies on the significance of this biogenic cycle on human activities that lead to chronic and acute releases of petroleum hydrocarbons.

[1] Lea-Smith *et al*. (2015), *PNAS* **112**, 13591–13596.
[2] Valentine & Reddy (2015), *PNAS* **112**, 13434-13435.