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Siderophore distributions in the Eastern Tropical South Pacific

Siderophores are iron binding complexes produced by bacteria as part of a high affinity iron uptake mechanism. They are thought to liberate iron from mineral particles and iron proteins and thus increase the amount of iron available to the producing bacteria, giving them a competitive advantage in environments where iron is scarce. Iron concentrations are extremely low in the ocean and siderophores have been identified in surface waters of the Atlantic(1) and Pacific Ocean(2), including the Eastern Tropical South Atlantic. However, little is known about the depth distribution of these compounds in the ocean or how oxygen abundance influences their distributions.

Here we report results from an investigation into siderophore distributions in surface and sub surface waters of the Peruvian upwelling, undertaken on a cruise in the austral spring of 2015. We investigated the diversity of dissolved siderophores in seawater at depths of up to 150 m. We further quantified the abundance of hydroxamate siderophores and examined their distribution in the context of the prevailing iron and oxygen conditions. To our knowledge this is the first investigation into the influence of oxygen concentrations on siderophore distributions, and we consequently reassess the current paradigm that siderophores are only produced in fully oxygenated environments.

(1) Mawji, E., Gledhill, M., Milton, J.A., Tarran, G.A., Ussher, S., Thompson, A., Wolff, G.A., Worsfold, P.J., Achterberg, E.P., 2008. Hydroxamate siderophores: Occurrence and importance in the Atlantic Ocean. *Environ. Sci. Technol.* 42, 8675–8680. doi:10.1021/es801884r

(2) Boiteau, R.M., Mende, D.R., Hawco, N.J., McIlvin, M.R., Fitzsimmons, J.N., Saito, M.A., Sedwick, P.N., DeLong, E.F., Repeta, D.J., 2016. Siderophore-based microbial adaptations to iron scarcity across the eastern Pacific Ocean. *Proc. Natl. Acad. Sci. U. S. A.* 113, 14237–14242. doi:10.1073/pnas.1608594113

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