LFPB Seminar

MAX PLANCK INSTITUTE
FOR DYNAMICS AND
SELF-ORGANIZATION

The impact of iron on biological nitrogen fixation in the ocean

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Biological nitrogen (N_2) fixation is yet the largest source of fixed nitrogen (N) to the ocean and therefore exerts control on ocean productivity. The nitrogenase enzyme, which converts inert N_2 gas into bioavailable ammonia, has a high iron (Fe) requirement, and Fe fluxes to the ocean, frequently dust-borne, are thought to steer the activity of N_2-fixing microorganisms. While experiments on cultivated microorganisms suggest that Fe availability directly influences N_2 fixation, shipboard experimental Fe additions to mixed microbial communities often fail to stimulate N_2 fixation rates challenging the mechanisms of regulation. The determination of nanoSIMS-based single-cell N_2 fixation rates of major cyanobacterial N_2-fixers upon Fe addition allows us to investigate the mechanisms of Fe use and the effect of Fe uptake on their activity. Our combined data suggest that the identification of major N_2-fixing microorganisms and how they utilize Fe is critical to predict N_2 fixation activity in the contemporary and future changing ocean, particularly considering anticipated changes in aeolian dust deposition with climate change.

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MPI-DS, Seminar room 0.79

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