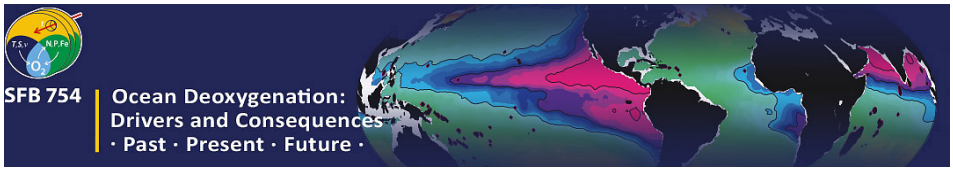

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Nitrogen biogeochemistry of oxygen minimum zones: what controls the distribution of microbes and N transformation reactions?

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Oxygen minimum zones are distinguished by characteristic distributions of the inorganic nitrogen compounds nitrate, nitrite, and nitrous oxide. Although many of the reactions that produce and consume these compounds are known, the mechanisms by which characteristic features, such as the secondary nitrite maximum and the subsurface nitrous oxide maximum, are maintained are not clear. Oxygen is one of the most important constraints on the distributions of chemistry and microbial reactions. Nevertheless, there is evidence for "incompatible reactions", such as oxidation of nitrite in the absence of oxygen and consumption of nitrous oxide in the presence of oxygen. Data from stable isotope tracer incubation experiments, distributions of natural abundance of stable isotopes, and molecular data on the composition, diversity and distribution of microbes and their key functional genes related to these processes will be considered. These data will be used to characterize the functional response of microbial N transformations involved in nitrite and nitrous oxide production and consumption in relation to oxygen concentration and other variables. Relationships between rate measurements and molecular data will be used to investigate the depth distribution of microbes, processes, and chemistry, and to develop hypotheses about control of the "incompatible reactions".

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