



SFB 754

**Sonderforschungsbereich 754
Climate-Biogeochemistry Interactions in the Tropical Ocean**

SFB 754 colloquium: Thursday, 11th Sept, 09:00h
Large Conference Room (west shore)

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Title:

Photosynthesis and respiration in pelagic low-oxygen environments.

Abstract:

Due to a lack of sufficiently sensitive analytical methods, microbial metabolism at low oxygen concentrations has been a severely understudied topic. We now have both optical and electrochemical sensors that can be used to analyze oxygen down to the few nanomolar level, and such sensors have been used to analyze microbial metabolism in both naturally occurring low oxygen waters such as found in oceanic Oxygen Minimum Zones (OMZs), in marine waters with artificially reduced oxygen, and in bacterial cultures. Oxidic respiration proceeds down to below detection levels (~ 3 nM), but with kinetics approaching Michaelis-Menten kinetics. The community K_m values in natural waters are very variable, depending on the source of the water and on the oxygen concentration history of the sample. We have thus observed apparent K_m values in natural planktonic microbial communities ranging from about 250 nM and down to below 20 nM. The oxygen consumption rates at the upper boundary of Pacific OMZs are typically in the range of 2-10 nM h⁻¹. A secondary chlorophyll peak associated with a high density of *Prochlorococcus* is often found at the upper boundary of the OMZ. Gross oxygen production rates in the maximum were 2-30 nM h⁻¹ under maximum in situ light intensities, but often respiration rates were higher than oxygen production rates resulting in net oxygen consumption rates. Oxygen could thus often not be detected in the secondary chlorophyll maximum but locations with a few hundred nanomolar O₂ in the maximum were also found.