



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

SFB 754 colloquium: Tuesday, 9th Sept, 09:00h  
Lecture Room (Hörsaal westhore)

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Title:

*On the life of a unicellular, diazotrophic cyanobacterium: from cultures to models*

Abstract:

The recent development of molecular and microscopic techniques has revealed the presence of new diazotrophic organisms in the world's ocean, and provided information on their genetic features. These discoveries also widened the puzzle of the oceanic, nitrogen budget. Individual groups of nitrogen fixers show episodic high abundances linked to physical processes, including mesoscale events. We studied the unicellular strain *Crocospaera watsonii* in the laboratory to analyze and describe how environmental conditions drive nutrients acquisition and biomass production. Metabolic processes in the phytoplankton are constrained by immediate environmental pressures. Cells experience these constraints at the scale of enzymatic reactions, and respond through diel fluctuations in their physiological processes, with a resultant dynamics at the scale of cell growth. Seasonal dynamics in the phytoplankton therefore result from the coupling of longer time scale processes with elementary growth processes like photosynthesis. Such cascades of complexity scales remain an open issue in ecosystem modeling. We developed a microalgae culture setup monitored by computers allowing application of physico-chemical forcing conditions, whose fluctuations are relevant in regard to the cell scale. Thus, we can locally recreate the biochemical environment of a phytoplankton cell and its dynamical evolution along time, mimicking processes that can take place in the natural environment. The set of sampling automaton provides a high frequency monitoring of physiological properties. It thus generates precious data sets on transient dynamics in the plankton, which prove particularly suitable to calibrate and validate mathematical models of carbon and nitrogen budgets in cells.