C-MORE BULA-Biogeochemistry of the Upper ocean: Latitudinal Assessment

Abstract: In April 2007, C-MORE scientists conducted a research cruise to characterize marine microbial biogeochemistry along a transect between Fiji and Hawaii. This cruise, C-MORE BULA (Biogeochemistry of the Upper ocean: Latitudinal Assessment), examined spatial variability in microbial oceanography along naturally occurring nutrient gradients, from the oligotrophic South Pacific Subtropical Gyre, across the nutrient-enriched equatorial waters, to the oligotrophic North Pacific Subtropical Gyre. Objectives of this cruise included 1) identification of prominent trends in plankton biomass, biomass structure, and elemental stoichiometry, 2) isolation of new Prochlorococcus ecotypes, 3) study of distribution, production and loss rates of dissolved hydrogen and its relationship to nitrogen fixation, 4) identification of spatial distributions of microbial community structure, and (5) study of spatial variability in community metabolism.

Key Observations and Results
• Strong gradients in plankton biomass and nutrient concentrations. pCO2 increased due to equatorial upwelling.
• Concentrations of H2 were greatest in regions where larger diazotrophs predominated and rates of N2 fixation were elevated.
• Increased nutrient availability in the equatorial waters resulted in shifts in photosynthetic community structure and increased rates of net primary production.

New Prochlorococcus Groups Discovered

Key Observations and Results
• New high light adapted Prochlorococcus ecotypes isolated from low nutrient surface waters: likely more groups await discovery!
• Both functional gene and T-RFLP 16S rRNA approaches illustrate regional differences in microbial assemblages.
• Identification of regional changes in microbial assemblages responsible for key processes in the ocean nitrogen cycle.