GORDON AND BETTY MOORE FOUNDATION

Team Karl Highlight

Methionine and dimethylsulfoniopropionate cycling in the North Pacific Subtropical Gyre

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Continuing previous work carried out at Station ALOHA, Daniela del Valle, a C-MORE post-doc in my laboratory, led the efforts to study the importance of methionine and dimethylsulfoniopropionate (DMSP) as sulfur sources in this system. This work was carried out in collaboration with Sergio Sañudo-Wilhelmy (University of Southern California) and Ronald Kiene (University of South Alabama).

Concentrations of dissolved methionine (dMet) were found to present a strong diel cycle, with the highest concentrations during the day-time (~50pM), and concentrations below the detection limit (0.17pM) at night (Figure). This study represents, to our best knowledge, only the second report of dMet concentrations measured by a direct approach, and the first one for an oligotrophic ocean system. The highest concentration of dissolved DMSP observed in this study was 1.0 nM, which is 20 times greater than the highest concentration of dMet observed during our sampling period. Moreover, DMSP concentrations did not present a strong diel cycle, therefore this compound was available for consumption throughout the day and night.

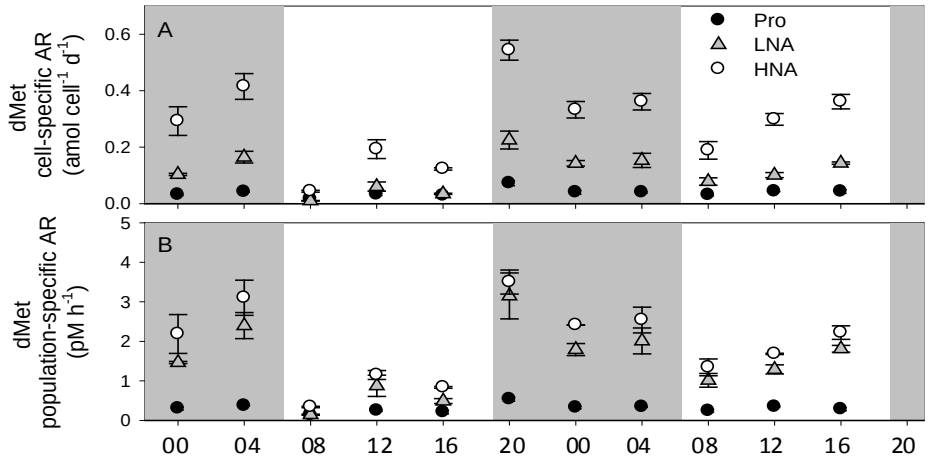

Figure. Diel cycle of (A) cell-specific and (B) population-specific dMet assimilation rates (AR). Pro: *Prochlorococcus*, LNA: low nucleic acid bacteria, HNA: high nucleic acid bacteria. Grey background indicates night-time, while white background indicates day-time.

Prochlorococcus accounted for, on average, only 10.7% and 7.1% of total dMet assimilation during the day- and night-time in the mixed layer, a much lower percentage than what would be expected based exclusively on its abundance (28.3%), indicating that in the NPSG *Prochlorococcus* does not exert a strong competitive pressure on other microbial populations with respect to dMet assimilation. In contrast, *Prochlorococcus* was more competitive in the assimilation of dDMSP, being responsible of 26 and 18% of total assimilation during the day and night, respectively. High nucleic acid bacteria are usually considered the more dynamic constituent of the bacterial assembly, and this is in agreement with our observation of high per-cell assimilation of both dMet and dDMSP by this bacterial group in surface waters.

We recently published a paper on “Methionine and dimethylsulonio propionate as sources of sulfur to the microbial community of the North Pacific Subtropical Gyre” (del valle and Karl 2015, *Aquatic Microbial Ecology*). The following data sets are provided: (1) Dissolved methionine (dMet) and dissolved DMSP (dDMSP) concentrations, including diel variability, (2) dMet/dDMSP assimilation rates, and (3) cell- and group-specific dMet/dDMSP assimilation rates.