Synopsis
SINC 5, May 14-16

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Environmental conditions

Start of the cruise was delayed due to wind (>20 kts) and waves (> 2 m). A low ground swell (< 1m) was experienced on the morning of 14 May, but winds were light. Calm and flat conditions continued for the duration of the cruise, with minimal cloud cover and consequently warm and sunny weather.

Water chemistry

Note – taking samples for further development of evaporation/concentration of [TDP]

CD-1, mid-day May 14. Surface temperature = ~3C. Sampled depths (5, 20, 50, 60, 70, 100, 150, 235m) for standard water chemistry parameters.

WM, mid-day May 15. Isothermal water column. Sampled newly modified in situ bottle array depths (2, 5, 10, 20, 30, 40, 60, 90, 120, 155m). Size fractions. High resolution depth sampling done for NO3, NH4, TDP, and chlorophyll by addition of depths (1, 3, 8, 14, 18, 23, 25, 35, 45, 50, 55, 65, 70, 80, 100, 130, 140, 160, 165, 170).

Nearshore underway, early AM May 16. Made first use of Blue Heron's underway water sampler system (not all electronics yet functioning). Sampled a transect of 15 points from 46 54.898, 90 11.723 to 46 36.971, 90 33.140 to get information on water chemistry associated with early south shore warming.

^{14}C production, nitrification.

At site WM did standard, JGOFS based primary production in situ array with modified depths and bottle numbers. Began at water collection at 0200 on May 15 and bottles were in the lake around 0545 (sky was very light this time). Nitrification using Hicks method done at all depths (no chlorate inhibitor due to investigator oversight).

^{15}N nitrification measurements

Two bottles per depth in bottle array using same procedure as previous array experiments using 250uL of 40uM Ammonium 15N Chloride stock per bottle.

In addition, we conducted an Ammonium 15N Chloride concentration gradient experiment in which 8 different levels (2 reps per level) of 14N/15N were added to samples bottles from 2 depths (5m and 155m). Bottles were darkened and incubated in the on-deck incubator for the same duration as the in-situ bottle array. The ratio of 15N to 14N was maintained at a rate of 10% 15N for all bottles using stocks of 40uM

Ammonium 15N Chloride and 400uM Ammonium 14N Chloride. Similarly, a time series experiment was performed using the same 2 depths as above (5m and 155m). Three liters of 5m and 3 liters of 155m water were spiked with a single concentration of 14N/15N, maintaining the ratio of 10% 15N. The 3 liters was then divided into incubation bottles to ensure homogenous replicates. Samples were again darkened and started at the same time as the prior 2 experiments but duplicate bottles were harvested at 3, 6, 9, and 16 hour intervals. Nearshore samples (warm water) were collected from 3 stations in the Chequamagon basin. These too were run in duplicate with the same spike concentration as above. Samples were incubated with water surface water and harvested after 4 hours.

Bottom sampling

Multicore used at CD-1 but problems with getting right balance of mud and water. After several attempts we had to run directly to WM and we saved mud sampling for end of cruise. Then got cores for WM and FWM. Total of four cores taken at each site. Two given to Katsev lab, who did oxygen profiling. Two brought to St. Paul for MIMS incubation.

A variety of bottom muds from some new sites (new sites "Sterner Grab 1, 2, 3, 4, 5, 6, 7", FWM) were collected using ponar dredge during trip home via Apostles. Collected samples for bulk density as well as for DEA.

Genetics and flow cytometry

Flow cytometry

Samples were collected for enumeration of heterotrophic bacteria, picophytoplankton, and nanophytoplankton. Triplicate samples were fixed with 1% (final concentration) buffered formaldehyde and frozen in liquid nitrogen. Flow cytometry samples were collected at all depths on the CD-1 and WM water column profiles and during the underway sampling.

Actinobacteria in the prokaryote community

Samples of the pelagic prokaryote community were fixed with 2% (final concentration) glutaraldehyde and collected on 0.2 µm filters for analysis by fluorescent *in-situ* hybridization (FISH). The abundance of eubacteria and actinobacteria within the prokaryote community will be determined by specific FISH probes and microscopic analysis. Triplicate samples were collected at 5m and 235m at CD-1, and 2m and 155m at WM.

Nucleic acids

Particulate samples were collected for nucleic acid extraction and molecular analysis at both CD-1 and WM stations. Whole water was passed through a Sterivex cartridge filter by peristaltic pump. Duplicate 3L samples were collected from 5m and a single 5L

sample from 235m at CD-1. Similarly, duplicate 3L samples were collected from 2m and a single 4L sample were collected from the profile at WM.