TITLE: BEST mesozooplankton grazing and predation rates

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DATA SET OVERVIEW:
This data set contains mesozooplankton grazing and predation rates measured in ship-board incubations conducted during the BEST 2010 spring process cruise on the R/V Thompson (TN249). The data set presents individual bottle measurements of mesozooplankton weight-specific clearance and ingestion rates for both chlorophyll *a* and microzooplankton in each experiment. Station number, experiment number, date, position (latitude, longitude), bottom depth, species/stage, and initial chlorophyll *a* or microzooplankton concentration are presented for each measurement in addition.

METHODS:
Feeding rate experiments were conducted using on-deck incubations with selected dominant mesozooplankton in natural particle assemblages as food under conditions that mimicked the ambient temperature and light environment. Zooplankton were collected with gentle vertical hauls of a 1-m^2, 150/300-µm plankton net equipped with a non-filtering 4-l codend. Upon arrival on-deck, the contents of the codend were immediately diluted by decanting into jars containing surface water that were kept near ambient temperature in coolers and transferred to an environmental room at –1 °C. In the environmental room, zooplankton were sorted to species and life history stage (e.g. *Calanus glacialis* stage C4) by microscope with a wide-bore pipet and transferred to beakers filled with filtered seawater. Care was taken to select only animals that were actively swimming and undamaged, with no broken antennae or setae. Animals were resorted by pipet to ensure accuracy and added to the experimental bottles with only a minimal amount of water so that the ambient particle concentration was not changed. The bottle size (1 to 8-l PC bottles) and the number of animals added to each jar was balanced so that ~25% of the bottle would be cleared during the experimental period based on changes in chlorophyll; larger bottle sizes were used for larger animals and vice-versa. Generally, three or four target organisms were selected for each experiment.

Incubation water with ambient particle assemblages for the experiments was collected from a predetermined depth with 30-l Niskin bottles attached to a CTD rosette equipped

with a fluorometer. An initial cast was made to obtain a fluorescence profile from which the depth for water collection was determined. The depth chosen for the experimental water was located at the chlorophyll maximum or in the upper-mixed layer if no maximum was found. At selected stations where water column chlorophyll concentrations were low and yet concentrations of ice algae in ice were high, an enriched treatment with ice algae added to the ambient water was also used.

Water was drained from the Niskin bottles into 50-l HDPE carboys with silicone tubing and immediately transferred to the environmental room for processing. All water collection and water handling materials were pre-cleaned in 10% HCL and rinsed with copious amounts of de-ionized water and all procedures were performed using nitrile gloves. If needed, nutrient additions were added to ensure that phytoplankton growth rates were similar in control and experimental bottles. The water was not prescreened so that ambient particles could be used unaltered. While being gently mixed with a long-handled PVC plunger, water was siphoned using silicone tubing from the carboy into the experimental bottles in random order. Bottles were inspected visually and any large zooplankton, not added intentionally, were removed by pipet.

For each treatment, we filled two initial bottles, three control bottles, and three experimental bottles per target organism. Pre-determined numbers of animals were added to each experimental bottle. All bottles were topped off with make-up water from the carboy, sealed with parafilm while ensuring that no bubbles were present in the bottles that might disrupt grazing behavior, and capped tightly with a lid. The control and experimental bottles were then wrapped in a combination of plastic films to mimic the light intensity and quality from the depth at which the water was collected and incubated for 24-hr on deck attached to a 1-rpm plankton-wheel that was exposed to full sun light and kept at near ambient temperature with continuous flowing surface seawater.

Microplankton abundance/biomass and chlorophyll concentrations were sampled at time zero for the two initial bottles and at termination for the control and experimental bottles. All bottles were treated in the same manner. Prior to sampling, the bottles were gently mixed by inversion. Water then was siphoned from the bottle into a beaker and the required volume decanted for each particular analysis. Great care was taken when siphoning from the experimental bottles so that animals were not removed. Depending on concentration, triplicate samples of 50 to 200 ml of total and <5 µm chlorophyll size fractions were filtered onto Whatman GF/F filters and immediately extracted in 90% acetone for 18 to 24 hrs. The chlorophyll *a* concentration then was determined with a Turner Designs fluorometer. For microplankton biomass and abundance, 200 ml subsamples were preserved in 5% final concentration acid-Lugol's solution to be analyzed later by inverted microscopy.

Following the water sampling for microplankton, animals from the experimental jars were collected and anesthetized with 0.6 g l^{-1} MS222 (3-Aminobenzoic Acid Ethyl Ester Methanesulfonate Salt). Under a dissecting microscope, each animal was identified, counted, and imaged with a digital camera for later morphometric analysis. The animal was then transferred to a pre-cleaned tin boat, dried at 60°C, and stored over desiccant until analyzed for carbon and nitrogen content with a Carlo Erba NA1500 CN analyzer.

Clearance and ingestion rates for chlorophyll *a* and microzooplankton were calculated from Frost's (1972) equations.

REFERENCES:

Frost, B.W., 1972. Effects of size and concentration of food particles on the feeding behavior of the marine planktonic copepod *Calanus pacificus*. Limnology and

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