Biogeochemical & Ecological Analysis of Complex Habitats - Between American Samoa & Hawaii (BEACH-BASH)

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The size structure of upper ocean plankton assemblages appears to play an important role in determining the efficiency of the biological carbon pump and the resultant carbon and nutrient cycling. The spatial and temporal dynamics in the size-structure of plankton populations in the upper ocean of the Pacific Ocean have been examined (Spadaccini et al., 2013). The study spanned several biogeochemical provinces including the oligotrophic, South Pacific, subtropical gyre, the nutrient-rich, equatorial upwelling region and the oligotrophic, North Pacific subtropical gyre. In general, the contribution of larger, phytoplanktonic size classes was increased along nutrient gradients, with smaller planktonic species dominating the oligotrophic, open ocean ecosystems. Such results further support the hypothesis that larger, mature phytoplankton populations are regulated by nutrient availability and whereby constitute an important source of carbon export in open ocean ecosystems.

**ABSTRACT**

To evaluate spatial variability in upper ocean plankton size structure, measurements of size-fractionated chlorophyll and ATP concentrations were assessed during a transect from Pago Pago, American Samoa to Honolulu, Hawaii (April 29 - May 9, 2005). A total of 28 stations were occupied during the transect (Figure 1). The stations were spaced at approximately equidistant intervals, 1° apart starting at 12°41.4'S, 170°35.6'W. The last station occupied during the transect coincided with the Hawaiian Time Zones (HOT) Station AMLD (24°57'N, 158°W). Each station was sampled and is indicated in figure by the yellow star.

**METHODS:**

Sampling was conducted from the R/V Kila Mariner during BEACH-BASH (Biogeochemical & Ecological Analysis of Complex Habitats - Between American Samoa and Hawaii), a transect cruise from Pago Pago, American Samoa to Honolulu, Hawaii (April 29 - May 9, 2005). A total of 28 stations were occupied during the transect (Figure 1). The stations were spaced at approximately equidistant intervals, 1° apart starting at 12°41.4'S, 170°35.6'W. The last station occupied during the transect coincided with the Hawaiian Time Zones (HOT) Station AMLD (24°57'N, 158°W). Each station was sampled and is indicated in figure by the yellow star.

**RESULTS:**

Water samples were collected from the near surface (~10 m) using a YSI Pro Plus multimeter. Chlorophyll a and ATP were determined using modified, automated fluorometric techniques. Chlorophyll a and ATP concentrations were measured using fluorometric techniques and are reported as μg Chl a/L and ng ATP/L, respectively. Small phytoplanktonic concentrations were measured using 100 µm filters. Phytoplankton were enumerated and identified by flow cytometry.

**CONCLUSION:**

The size structure of upper ocean plankton assemblages appears to play an important role in determining the efficiency of the biological carbon pump and the resultant carbon and nutrient cycling. The spatial and temporal dynamics in the size-structure of plankton populations in the upper ocean of the Pacific Ocean have been examined (Spadaccini et al., 2013). The study spanned several biogeochemical provinces including the oligotrophic, South Pacific, subtropical gyre, the nutrient-rich, equatorial upwelling region and the oligotrophic, North Pacific subtropical gyre. In general, the contribution of larger, phytoplanktonic size classes was increased along nutrient gradients, with smaller planktonic species dominating the oligotrophic, open ocean ecosystems. Such results further support the hypothesis that larger, mature phytoplankton populations are regulated by nutrient availability and whereby constitute an important source of carbon export in open ocean ecosystems.

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