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TITLE: Composition and structure of macrozooplankton and micronekton communities in the vicinity of free-drifting Antarctic icebergs

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ABSTRACT:

Recent warming in the Antarctic has led to increased production of icebergs; however, the ecological effects of icebergs on pelagic communities within the Southern Ocean have not been well-studied. We used a 10 m<sup>2</sup> MOCNESS to collect macrozooplankton and micronekton in the upper 300 m of the water column near free-drifting icebergs in the Atlantic sector of the Southern Ocean during three seasons: December 2005 (late spring), June 2008 (late fall) and March-April 2009 (late summer). Communities were dominated in all three seasons by Antarctic krill (*Euphausia superba*) and salps (*Salpa thompsoni*), which collectively comprised 60-95% of the community wet biomass in most cases. During our spring and summer cruises, mean biomass was elevated by 3.1-4.3x at a distance of 0.37 km from large icebergs vs. 9.26 km away. These differences were not statistically significant, and no trend in biomass with distance was apparent in samples from fall 2008, when total biomass was an order of magnitude lower. Biomass levels near icebergs during Dec 2005 and Mar-Apr 2009 were comparable to values reported from marginal ice zones, suggesting that waters around icebergs support macrozooplankton and micronekton communities comparable in magnitude to those in some of the most productive areas of the Southern Ocean. Sample variance also was significantly higher within 1.85 km of icebergs during Dec 2005 and Mar-Apr 2009, reflecting increased patchiness on scales sampled by the MOCNESS (20?40x103 m<sup>3</sup> filtered per sample). This pattern was not significant during Jun 2008. Large predatory medusae were observed within 1.85 km of icebergs and in Iceberg Alley, an area through which icebergs pass frequently, but were virtually absent in areas remote from icebergs. Small euphausiids showed an inverse distribution, with low densities in areas populated by large medusae. A shift in community composition from a near-iceberg assemblage dominated by herbivores to a carnivore-dominated community in Iceberg Alley may reflect a transition from bottom-up to top-down control with increasing distance and time. Body sizes of dominant species varied seasonally but did not show consistent trends with distance from icebergs. Concentrations of photosynthetic pigments in the guts of *E. superba* and *S. thompsoni* corresponded broadly to patterns in surface chlorophyll a concentrations and were comparable to maximum gut pigment concentrations measured in animals collected from highly productive marginal ice zones. Our results suggest that the macrozooplankton and micronekton assemblages near free-drifting icebergs can be quantitatively and qualitatively different from those in surrounding, iceberg-free waters, perhaps due to both bottom-up and top-down processes as well as physical forcing by the passage of a large object through the upper ocean.

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