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SOUTHERN OCEAN CONTINUOUS PLANKTON RECORDER SURVEY: SPATIAL AND TEMPORAL VARIATION IN ZOOPLANKTON ABUNDANCE, DISTRIBUTION AND COMPOSITION

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Significant changes in zooplankton composition have occurred in various ocean systems in recent years. These changes can be quite dramatic, occurring within one or two seasons, as happened with the regime shift in the North Sea and North Atlantic in the late 1980s. Such regime shifts have impacts on higher trophic levels. Antarctica and surrounding waters are speculated to be particularly sensitive and vulnerable to climate change and Antarctic zooplankton may respond to climatic forcing in the same fashion as demonstrated elsewhere. The effect of global warming on cold water plankton, oceanographic and sea-ice patterns, plus UV impact may also trigger a sudden change in the plankton with subsequent impacts through the rest of the ecosystem. The Southern Ocean Continuous Plankton (SO-CPR) Survey started in 1991, with the purpose of mapping the biodiversity of zooplankton and to monitor the health of the region by using the sensitivity of plankton to environmental change as early warning indicators. The survey specifically focuses on defining the spatial, short and long-term temporal variability in plankton patterns through the region, particularly variation in biogeographic zonation through the Antarctic Circumpolar Current (ACC) and in the sea ice zone (SIZ). The survey covers more than half of the Southern Ocean, involving Australia, Japan, Germany, UK and New Zealand. Tows are conducted throughout the Antarctic shipping season, normally September to April, but occasionally in winter. Multivariate analyses of the CPR data have revealed discrete and easily definable zooplankton assemblages in each of the zones between the fronts. While the physical characteristics of the fronts can be subtle, the demarcation between assemblages is clear, with the plankton effectively amplifying cross-frontal physical changes. Latest analysis of zooplankton species composition in the SIZ showed a marked change in species composition in the late 1990's from a krill dominated community to one comprising smaller zooplankton in higher abundance more typical of the open ocean north of the SIZ. Changes in SIZ primary production may be the cause of the change, which in turn may affect the survival of krill dependent higher predators.