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Philip Boyd is a Professor of Marine Biogeochemistry at IMAS, UTAS in Hobart. He is a theme leader of 'Water column and sea ice foodwebs' in the ARC-funded Antarctic Gateway Programme, and the leader of a new project within the ACE-CRC on "Biological responses to environment change". Boyd's research focuses on both lab and field work on Southern Ocean biogeochemistry and ecology in both polar and subpolar waters. He is currently contributing to the IPCC SROC polar chapter, and will be a lead author in the forthcoming IPCC AR6 cycle.

What do manipulation experiments tell us about how Southern microbes and zooplankton will respond to ocean global change?

Marine life in the Southern Ocean are responding to myriad changes in their environments. Concurrent changes in temperature, salinity, wind fields, and sea ice cover are modifying the degree of upper ocean stratification and the depth the surface mixed layer. These in turn alter the supply of nutrients such as iron and the underwater light climate. Together, changes to these multiple drivers will alter patterns of primary productivity and phytoplankton community structure with consequent effects to the flow of energy into subpolar and polar food webs. What is the likely magnitude of these potential shifts to the base of the marine food web and how will they vary polewards? Here I will review progress at the ACE CRC over the last three years on phytoplankton responses to multiple drivers, and attempt to place them in the context of higher trophic levels. I will also present a meta-analysis (from microbes to krill, based on climate change manipulation studies) to enable discussion of how top-down effects of herbivores will also interact with changes to phytoplankton dynamics due to bottom-up environmental forcing.