MEASO18
Marine Ecosystem Assessment for the Southern Ocean

Andrew Lenton

CSIRO Oceans and Atmosphere, Australia

Projected Changes in Ocean Acidification in the Southern Ocean under high emissions

Andrew Lenton [1,2], Richard J. Matear [1], Matt Chamberlain [1]

[1] CSIRO Oceans and Atmosphere, Hobart, Tasmania, Australia; [2] Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart, Tasmania, Australia

The Southern Ocean plays a critical role in the global carbon cycle, taking up about 40% of the total annual oceanic uptake of carbon dioxide (CO2). As this CO2 enters the ocean, the chemistry of the seawater is altered leading to changes in carbonate ion concentration and pH, collectively known as ocean acidification. Ocean acidification has the potential to impact the entire marine ecosystem from microbial communities to top predators through impacting calcification, reproductive health, food web structure, nutrient availability, physiological process and more; these impacts are already being felt in some parts of the Southern Ocean. While studies have projected changes over this critical region, these studies are yet to account for the mesoscale, which plays major role in ocean dynamics and biogeochemistry. Here for the first time we use an eddy-resolving global ocean biogeochemical model, that simulates the mesoscale to project how the Southern Ocean may change in response to high emissions (RCP8.5; or "business as usual") scenario. To do this we use the 1/10-degree CSIRO Bluelink model driven with a combination of JRA55 forcing and CMIP5 output, from present day up to 2100. Here we see very large changes in pH and carbonate ion concentration, both for aragonite and calcite, associated with high emissions. Interestingly we also see large spatial differences across the Southern Ocean particularly in different basins. Furthermore, we see these changes in ocean acidification do not occur in isolation, but are associated with large changes in ocean temperature, salinity and oxygen. These results highlight the need to account for finer scale dynamics in projecting future changes in the Southern Ocean.