



NZCCRI Seminar Series



Speaker: Dr Sam Dean, NIWA

Breaking the ice: storm-induced sea-ice breakup and the implications for ice extent

The propagation of large, storm-generated waves through sea ice was only recently measured for the first time, in either polar region, by Dr Alison Kohout of NIWA. Her experiment demonstrated that storm-generated ocean waves propagating through Antarctic sea ice are able to transport enough energy to break sea ice hundreds of kilometres from the ice edge, much further than would be predicted by the accepted theory of exponential decay. This result implied a more prominent role for large ocean waves in sea-ice breakup and retreat than previously thought. After briefly outlining Alison's results this talk examines the wider relevance of this experiment by demonstrating that observed retreat and expansion of the Antarctic sea-ice edge is highly correlated with changes in significant wave height in the Southern Ocean. This includes capturing the spatial variability in sea-ice trends found in the Ross and Amundsen–Bellingshausen seas. The atmospheric drivers responsible for these trends in wave height are also considered. The relative importance of this new mechanism for sea ice change remains tantalizingly out of reach, as climate models do not include wave-ice interaction. The failure to capture the observed changes in Antarctic sea ice as well as the underestimate of the rate of sea ice loss in the Arctic suggests that the incorporation of explicit or parameterized interactions between ocean waves and sea ice may be an important piece of “missing physics” needed to improve even our best climate models. The steps required to address this problem are briefly outlined.

Date: Tuesday 5th August 2014

Time: 4 - 5pm

Venue: Cotton Seminar CO304

Sam is a climate modeller working at NIWA, Wellington, as well as an adjunct researcher of the CCRI. He has strong research interests in using climate models and instrumental observations to understand the dominant drivers of climate variability over New Zealand, Antarctica and the Southern Hemisphere. He is also interested in the area of detection and attribution, which involves identifying the fingerprint of anthropogenic warming in current climate. His particular interest in this regard is extreme rainfall, as he believes New Zealand location and topography make it highly susceptible to any changes. Sam also has considerable experience in climate model development, climate change projections and dynamical meteorology.