



Southern Ocean response to strengthening winds in an eddy-permitting global climate model

John 'Paul' Spence (1), John Fyfe (2), and Andrew Weaver (3)

(1) Climate Change Research Centre, UNSW, Sydney, Australia, (3) University of Victoria, Canada
(weaver@ocean.seos.uvic.ca), (2) Canadian Centre for Climate Modelling and Analysis, Environment Canada
(John.Fyfe@ec.gc.ca)

A global climate model with horizontal resolutions in the ocean ranging from relatively-coarse to eddy-permitting is used to investigate the resolution dependence of the Southern Ocean response to poleward intensifying winds through the past and present centuries. The higher resolution simulations show poleward migration of distinct ocean fronts associated with a more highly localized near-surface temperature response. The higher resolution simulations also show increasing southward eddy heat transport, less high-latitude cooling and greater sea-ice loss than the lower resolution simulations. For all resolutions, from relatively-coarse to eddy-permitting, there is poleward migration of the Antarctic Circumpolar Current in the Atlantic and western half of the Indian basin. Finally, zonal transports associated with the Antarctic Circumpolar Current are shown to be sensitive to resolution, and this is discussed in the context of recent observed change.