

Factors influencing changes in regional sea level projected by AOGCMs

Jonathan Gregory[†]; Anne Paradaens; Jason Lowe; Nathaëlle Bouttes; Till Kuhlbrodt

[†] NCAS-Climate, University of Reading, UK and Met Office, UK, United Kingdom

Leading author: j.m.gregory@reading.ac.uk

Owing to changes in ocean density and circulation, regional sea level change during the 21st century is projected to deviate substantially from the global mean, but climate models do not agree on the geographical patterns. The model spread in the projected patterns of CMIP3 models is no less than in the models of the IPCC TAR. Steric changes largely dominate the patterns, with a relatively small contribution associated with change in the barotropic circulation. In general, thermosteric changes determine the spatial variations in the Southern Ocean, halosteric changes dominate in the Arctic and strong compensation between thermosteric and halosteric changes characterises the Atlantic, where the amplitude of regional sea level change appears to be linked to the weakening of the Atlantic meridional overturning circulation. In the HadCM3 AOGCM, changes in surface fluxes of heat, freshwater and wind stress are all found to produce significant and distinct regional sea level signatures, with wind stress changes being the most important, and regional density change has an important contribution from redistribution of ocean heat content.