Geophysical Research Abstracts
Vol. 12, EGU2010-14395, 2010
EGU General Assembly 2010

Time variability of the Southern Ocean gravest empirical mode

Andrew Meijers (1), Nathan Bindoff (2,3), Steve Rintoul (1,3)
(1) CSIRO, Hobart, Australia, (2) University of Tasmania, Hobart, Australia, (3) CAWCR, Hobart, Australia

We examine the first order temporal trend in the Southern Ocean gravest empirical mode (GEM) over the period 1992-2006 to observe the change in Antarctic Circumpolar Current (ACC) density structure. Combining this trend with a time evolving satellite GEM (satGEM) projection of the temperature and salinity fields resolves the change in Southern Ocean heat and freshwater content into an adiabatic component driven by frontal movement, and a diabatic part driven by fluxes of heat and freshwater. The southward trend of the Antarctic Circumpolar Current (ACC) fronts drives a net adiabatic warming equivalent to 0.056 ± 0.004 PW over most of the ACC and over all depths in the satGEM. This is strongest at the SubAntarctic Front (SAF). The deep water masses tend to freshen, while SubAntarctic Mode Water (SAMW) and Antarctic Intermediate Water (AAIW) increase in salinity for a net trend of 0.009 ± 0.001 Sv. These heat and freshwater trends are respectively significantly larger and smaller than those estimated from *in situ* observations. The addition of a diabatic contribution rectifies this and we show there is a cooling (-0.029 ± 0.006 PW) and strong freshening (0.044 ± 0.002 Sv) over this period, so that the net heat and freshwater trends are 0.027 ± 0.004 PW (0.591 ± 0.093 Wm^{-2}) and 0.053 ± 0.001 Sv (36.12 ± 0.68 mmy^{-1}m^{-2}).