Geophysical Research Abstracts
Vol. 21, EGU2019-1914, 2019
EGU General Assembly 2019

Observed oceanic storm track dynamics in Drake Passage

Annie Foppert (1,2)

(1) CSIRO Oceans and Atmosphere, Hobart, TAS, Australia (annie.foppert@csiro.au), (2) Centre for Southern Hemisphere Oceans Research, Hobart, TAS, Australia

The dynamics of an oceanic storm track – where energy and enstrophy transfer between the mean flow and eddies – are investigated using observations from an eddy-rich region of the Antarctic Circumpolar Current downstream of the Shackleton Fracture Zone (SFZ) in Drake Passage. Four years of measurements by an array of current- and pressure-recording inverted echo sounders deployed between November 2007 and November 2011 are used to diagnose eddy-mean flow interactions and provide insight into physical mechanisms for these transfers. Averaged within the upper-mid water column (400-1000 meters depth) and over the four-year record mean field, eddy potential energy (EPE) is highest in the western part of the storm track and maximum mean eddy kinetic energy (EKE) occurs farther away from the SFZ, shifting the proportion of eddy energies from EPE/EKE > 2 to about 1 along the storm track. There are enhanced mean 3D wave activity fluxes (W) immediately downstream of SFZ with strong horizontal flux vectors emanating northeast from this region, roughly perpendicularly away from the SFZ axis. Significant spatial and temporal correlations of the horizontal and vertical fluxes indicate barotropic and baroclinic processes, respectively, occur simultaneously in this oceanic storm track. Consistently, explaining the eddy energetics pattern requires both horizontal and vertical components of W, implying the presence of mixed barotropic-baroclinic instability immediately in the lee of the SFZ in Drake Passage.