Geophysical Research Abstracts
Vol. 20, EGU2018-16875, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

Variability and drivers of the ice-covered Ross Gyre circulation

Tiago Dotto (1), Michel Tsamados (2), Alberto Garabato (2), Sheldon Bacon (3), Andy Ridout (1), Paul Holland (4), and Tom Armitage (5)

(1) University College London, Center for Polar Obsevation and Modelling, Earth Sciences, London, United Kingdom (m.tsamados@ucl.ac.uk), (2) Ocean and Earth Science, University of Southampton, Southampton, UK, (3) National Oceanographic Centre, Southampton, UK, (4) British Antarctic Survey, Cambridge, UK, (5) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, USA

The Ross Gyre (RG) is one of the main current systems of the polar Southern Ocean, and conveys the warm waters from the Antarctic Circumpolar Current toward the cold continental shelves of the Antarctic Pacific sector - regulating the stability of the Ross Ice Shelf. Due to the seasonal sea ice cover, little is known on the variability of the RG circulation and its driving forces. Here, novel altimetry data from Cryosat-2 is used to document the variability and drivers of the RG circulation in the period 2011-2015. The variability of altimetric sea surface height (SSH) is highly coherent with that of ocean bottom pressure inferred from the GRACE mission, suggesting that RG variability on time scales up to interannual has a dominant barotropic component. The ocean surface stress curl was identified as the main driver of the observed variability in the surface circulation. Statistical analyses indicate that variations in the area and strength of the RG are regulated by ice-mediated wind forcing via two distinct dynamical modes of SSH variability: (1) one involving barotropic modes that either follow the continental shelf break around the entire Antarctic continent or are trapped within the Southeastern Pacific basin; (2) and another implicating coherent variability across all ice-covered regions of West Antarctica. This work illustrates the potential of this new altimetric technique in uncovering the nature and dynamics of the circulation in the ice covered Southern Ocean.