Session: C44 Poster: Th204A

The impact of increased wind stress on the Southern Ocean carbon distribution: Results from a high-resolution ocean model

Nicole Lovenduski[†]; Takamitsu Ito; Daniel Jones
[†] University of Colorado at Boulder, USA
Leading author: nicole.lovenduski@colorado.edu

The Southern Ocean currently serves as a sink for atmospheric carbon dioxide. However, recent observational studies find that the strength of this carbon sink has weakened over the past few decades. Ocean general circulation models suggest that the primary cause of Southern Ocean sink reduction is a trend in the position and intensity of Southern Hemispheric westerly winds and the subsequent increase in wind-driven upwelling of waters rich in dissolved inorganic carbon (DIC). However, such models do not explicitly resolve mesoscale eddies, which can play a crucial role in setting the mean circulation of the Southern Ocean and its response to changes in the surface wind. These eddies are believed to affect the uptake and storage of anthropogenic carbon, and yet the impact of eddy activity on the distribution and fluxes of natural carbon is poorly understood. Here, we examine how intensified westerly wind can alter the upwelling and distribution of natural DIC in the Southern Ocean using an idealized ocean general circulation and biogeochemistry model run with eddy-permitting horizontal resolution. We examine in detail how mesoscale eddies respond to changes in wind stress and how their explicit resolution influences the distribution of natural DIC in the Southern Ocean.