EGU22-10432
https://doi.org/10.5194/egusphere-egu22-10432
EGU General Assembly 2022

Tidal effects in a global general circulation model: comparison between coarse and high resolution configurations

Federica Borile[1,2], Simona Masina[1], Doroteaciro Iovino[1], Nadia Pinardi[2], and Paola Cessi[3]
[1]Euro-Mediterranean Center on Climate Change (CMCC) Bologna, Italy
[2]University of Bologna, Department of Physics and Astronomy, Bologna, Italy
[3]Scripps Institution of Oceanography, University of California, San Diego, La Jolla, California

The energy budget of the global ocean circulation highlights the importance of winds and tides as main sources of energy. As wind forcing acts at the ocean surface, tidal potential affects the entire water column and, in regions of rough topography, it generates energy conversion from barotropic to baroclinic high frequency modes. An intercomparison is computed between experiments with and without tidal forcing, using a global ocean general circulation model in two different configurations, respectively mesoscale-permitting and mesoscale-resolving ones. Regardless of the resolution, the contribution of tides to the mean kinetic energy is negligible on the global scale, while it enhances the eddy kinetic energy, especially on continental shelves and rough bottom topography sites, where internal waves are generated before being dissipated or radiated away. The interaction between these waves and mesoscale features is enhanced in the higher-resolution experiments, and their effects on the mean circulation are analysed in two regions where the tidal activity is well documented: the North-West Atlantic Ocean and the Indonesian region. We investigate the impact of internal tides presence on the modelled tidal amplitude, and we include a topographic wave drag as an additional term of internal wave dissipation.