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Diagnosis of inertio-gravity waves in an oceanic general circulation model

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Turbulent mixing in the ocean interior mostly results from the breaking of inertio-gravity waves. These waves are mainly generated at the upper and lower boundaries by barotropic tides and indirectly by the atmospheric forcing and then propagate into the ocean interior. Owing to their typical horizontal wavelengths lying within the submesoscale domain they can only be partly resolved by an Oceanic General Circulation Model (OGCM). This work focuses on the diagnosis of these waves in an OGCM as a preliminary step toward the development of a specific parameterization of wavebreaking. The area of interest is the Indian Ocean where the Cirène experiment took place in Winter 2007. The oceanic model was NEMO with 0.5° horizontal resolution and 300 vertical levels. The atmospheric fields were either defined via external daily forcing or via a coupled ocean-atmosphere simulation in which the time-exchange varied from 12min to 2h. The analysis of numerical outputs gave evidence of significant energy radiation around the inertial frequency into the ocean interior, in rough agreement with observations. However the higher frequency part of the spectrum can not be reproduced by the model. A kinetic energy budget was performed and provided estimates of the wind-generated power available to the deep ocean and of the energy flux into baroclinic inertio-gravity waves. A comparison between different parameterizations

will be presented and improvements of these parameterizations will be proposed in the light of in situ observations.