

**INTERNAL TIDES AND MIXING IN THE WEDDELL SEA**

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Global deep water production and thus, the global conveyor belt are affected by mixing around the Antarctic margins, especially in the Weddell Sea. One of the predominant sources of deep water mixing is believed to be tides and an oft suggested improvement to global circulation and climate simulations is the inclusion of tides.

To evaluate the role of tides in mixing in the Weddell Sea, barotropic and baroclinic tides were simulated for the Weddell Sea using ROMS. The model replicated observed tides reasonably well with estimates for both tidal elevations and velocities showing good agreement with existing observations. The most significant discrepancies occurred deep under the ice shelf for the semidiurnal tides and along the continental slope for the diurnal tides. Along the continental slope, the model overestimated the generation of diurnal continental shelf waves.

Diurnal tides were barotropic throughout the basin. However, internal tides were generated at semidiurnal frequencies over rough topography. Over the continental slope, semidiurnal baroclinic tidal generation was enhanced by the existence of continental shelf waves, through their harmonics. Baroclinic tides generated over rough topography in the northern Weddell Sea incited inertial oscillations as they propagated south. These inertial oscillations varied with depth since they were incited at different depths at different times as the internal tide progressed. Both the baroclinic tides and inertial oscillations induced vertical shear in the water column, increased the divergence of the horizontal surface velocities, and increased the vertical diffusivity as estimated by the model. Temperature differences indicate that the baroclinic tides induced mixing over rough topography and along the continental shelf break.