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Characteristics of lee wave generation in the World Ocean

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The rate of generation of internal gravity waves in the lee of small length scale topography by geostrophic flow in the World Ocean was estimated using simple linear theory with corrections for finite amplitude topography. Several global data sets were combined for the calculation including a global ocean general circulation model for the near-bottom geostrophic flow statistics, over 500 moored abyssal current meter records to assess the model, historical climatological data for the buoyancy frequency, 178 deep water CTD casts to assess the climatological data, and two independent estimates of the small scale topographic statistical properties. The first topography estimate was based on an empirically-derived relationship between paleo-spreading rates and abyssal hill roughness, with corrections for sedimentation. The second estimate was based on small-scale (< 100 km) roughness of satellite altimetry-derived gravity field, using upward continuation relationships to derive estimates of abyssal hill roughness at the seafloor at scales less than approximately 20 km. Lee waves generation was found to be an important part of the global mechanical energy budget of the balanced flow.