Altimeter-based global observations of baroclinic inertia-gravity wave turbulence

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Based on Topex/Poseidon altimeter data for the North Atlantic and for several selected regions in other parts of the World Ocean, we investigate the component of the sea surface height (SSH) variability associated with baroclinic inertia-gravity (IG) wave turbulence. The fact that the characteristic period of these waves, at mid-latitudes, is shorter than 1 day allows us to filter lower-frequency components out of the total SSH signal and derive wavenumber spectra and spatial autocovariance functions not affected by ocean eddies, Rossby waves and other slow motions. The characteristic amplitude and other properties of baroclinic IG waves are then estimated. SSH spectra exhibit typical features of scale-dependent wave turbulence: breaks in power laws, dependence on the intrinsic scale of the problem (Rossby radius of deformation), etc. Possible implications of spectral cascades of wave energy and action for tidal energy dissipation and for generation of small-scale turbulence by internal wave breaking are discussed. We also point out that IG waves complicate the use of altimeter measurements for ocean circulations studies and numerical modelling. Physics issues are discussed in a related talk in session NP5.1/OA12.

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2.G14/0A3 Altimetry, Remote Sensing and Modelling of the Oceans.

3. Dr. Jens Schröter, Prof. Dr. Hans Sünkel

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5. Oral

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