

Numerical modeling of acoustic radiation from oceanic swell using CIP-CUP scheme

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Oceanic surface gravity waves called as swells with period of several seconds radiate atmospheric acoustic waves called as microbaroms with half the period. The radiated microbaroms are continuously observed with microbarometers on the ground near the coast. From the observed microbaroms we could estimate the amplitude of oceanic swells and the temperature and wind of atmosphere because the amplitude of microbaroms depends on that of swells, and the propagation velocity of microbaroms depends on the temperature and wind. For the estimation we develop a coupled ocean-atmosphere model. General coupling models consist of independent parts of ocean and atmosphere coupled by complicated boundary conditions. Instead we model ocean and atmosphere as a unified fluid to exclude the boundary condition, using CIP-CUP (Constrained Interpolation Profile - Combined and Unified Procedure) method. This method make it possible to precisely compute the advection part and to stably compute the ocean-atmosphere boundary, which has a considerable density gap of three order of magnitude. In this presentation, we compare the computed microbaroms radiation with an analytical model to discuss the validity of our model.

Keywords: microbarom, infrasound, atmospheric acoustic wave, swell, oceanic surface gravity wave, CIP-CUP method