

Estimation of energy source of near-inertial oscillations observed at abyssal depths in Main Gap of the Emperor Seamount Chain

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Prominent peaks near the inertial frequency (local f is $9.24 \times 10^{-5} \text{ rad s}^{-1}$ and actual peak frequency is $1.05 f$) in clockwise rotary spectra were found at 5445-meter and 5855-meter depths in the deepest, widest gap in the Emperor Seamount Chain, called “Main Gap”, with mooring observation at $39^{\circ} 20' \text{ N}$, $169^{\circ} 56' \text{ E}$ (5895-m bottom depth) from 10 June 2016 to 25 June 2017. Band-passed current speed focused to the near-inertial frequency has a tendency of seasonal change; it was the lowest during the period from July to October 2016, the highest during the period from November 2016 to January 2017, and decreased toward June 2017. This temporal variation coincides roughly with the time series of 10-m wind speed above the mooring site according to the ERA5 dataset. The actual peak frequency ($1.05 f$) which is slightly higher than the local f indicates the southward energy propagation of the inertial oscillation from the northern surface according to Garrett (2001). Estimation of its ray shows that it would be generated at the surface by wind around $42^{\circ} 30' \text{ N}$ (depending on the assumption of spatial distribution of buoyancy frequency) and its energy would propagate southward beyond Nintoku Guyot.

Keywords: abyssal ocean current, near-inertial oscillation, direct current measurement, Main Gap of Emperor Seamount Chain