Generation and progradation processes of sub-inertial waves in the Japan Sea by plus-like sea-level rise at the Tsushima Strait

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Generation processes of sub-inertial waves in the Japan Sea (JS) by plus-like sea-level rise at the Tsushima Strait (TS) taken from East China Sea by Typhoon 1216 were investigated using mooring current meter data, sea level data, and numerical experiments. After sea level rising in and around the TS, sea-level elevated throughout the northern coast of Honshu, Japan. Sea level elevation propagated with the coast on their right with propagation speed of 2.0-3.5m/s from the TS to Tsugaru Strait (TsS). The sea level rising was accompanied by currents with the coast on their right trapped by the coast in the surface layer around San' in coast near the TS. Sea-level also rose simultaneously along the northeastern coast of the northern part of Honshu after the sea-level had had maximum around the San' in coast. From these results, it is judged that the pulse-like sea-level rise in the TS gave impact to the JS, and caused to generate coastal-trapped waves (CTWs) and external-mode waves along the Honshu coast. These processes were delineated by the result of numerical experiments performed with a two-layer model using realistic topography and a typhoon model. The model showed that the CTWs propagated with characteristics of continental shelf waves from the TS to Noto Peninsula (NP), whereas it had characteristics of internal kelvin waves from NP to TsS. The model also showed that the external-mode waves were considered to be external kelvin waves because of sea level elevation propagating with the coast on their right in the JS. Finally, the model showed that the sea-level rising accompanied by typhoon at the TS was caused by not only inverted barometric effect but also Ekman pumping with horizontal distribution of wind shear in front of typhoon.

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