

Harmonic seismic waves excited by far-field earthquakes

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It was observed the very harmonic seismic waves with a period of 17 s after 09:30 (UT) on Nov. 11 in 2018, at the mostly seismic stations in the global broadband seismograph network. It is assumed that the hypocenter of the harmonic waves was off Mayotte Island in the northern Mozambique channels between the continent of Africa and Madagascar Island. The physical cause of these waves remains unclear.

In order to understand such characteristic seismic waves, I firstly calculated the running spectra from Nov. 1 to Nov. 20 in 2018, using the observed seismograms at the station, ABPO, operated by IRIS/IDA. This station is the nearest station from the assumed hypocenter among the stations of the global seismograph network. From these running spectra, I found that the harmonic waves excited by the near- and far-field earthquakes. There were 10 far-field earthquakes whose magnitudes were larger than 6, in this period. Because the depths of 3 earthquakes in these 10 earthquakes were deeper than 100 km, I considered the remaining 7 shallow earthquakes. I investigated 2 larger earthquakes than others. The first one occurred in Jan Mayen Island region on Nov. 9 in 2018 (Mw6.7, hereafter EQ-J2018), and the second one occurred in South Sandwich Islands region on Nov. 15 in 2018 (Mw6.4, EQ-S2018). There was another earthquake near EQ-J2018. It occurred on Aug. 20 in 2012 (Mw6.7, EQ-J2012). There were two similar earthquakes near EQ-S2018, occurred on Dec. 8 in 2010 (Mw6.3, EQ-S2010) and on May 10 in 2017 (Mw6.5, EQ-S2017). From the comparison of the observed seismic waves between the similar hypocenter earthquakes, I found that the amplitudes of the surface waves in the earthquakes in 2018 (EQ-J2018, EQ-S2018) were several times as much as the ones in the previous earthquakes (EQ-J2012, EQ-S2010, EQ-S2017), at some stations.

In this study, I will show the features of these harmonic waves and to discuss the possible mechanisms.

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