

Monochromatic oscillation and its frequency variation from 7 to 11 mHz observed at F-net IGK station, Ishigakijima, Japan

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Some distinctive oscillations with a frequency of around 10 mHz were frequently found in the F-net IGK broadband seismometer data acquired and distributed by NIED on the feasibility study using initial data of the newly installed seismometers (Nawa et al., 2015) in Ishigakijima, Okinawa, Japan. By analyzing the continuous data (20Hz-sampling BH*, 1Hz-sampling LH* channels) of the F-net IGK station, we found spectral peak of approximately 11mHz at the period of January 2012 to June 2014, and its gradual frequency decrease from 11 mHz to 7 mHz at the period of July 2014 to April 2015, mainly in the NS component. From the comparison between teleseismic waves observed at IGK and those at surrounding stations (Kimura et al., 2015), and noise analysis (Kimura, 2015), it has been confirmed that the F-net IGK seismometer is operating normally at those period. In comparison with observed water level of the Nagura dam for irrigation near the F-net IGK station, it was found that the observation period of frequency of 11mHz corresponds to the period of the full water level of the dam. And we found a good correlation between frequency variation of the peak and the reservoir water level temporal variation. By using numerical simulations via the COMSOL Multiphysics®, we demonstrated that a frequency of fundamental mode of the dam reservoir seiche coincided with the observed frequency of oscillation at full water level. Also, the simulation revealed a relation the frequency decrease with the water level/amount decrease. From these conditions, observed oscillation on F-net IGK broadband seismometer records is concluded as the seiche of Nagura dam reservoir.

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