

Seismic Noise Levels of the Seafloor Borehole Broadband Seismic Observatories in the Northwestern Pacific

Masanao Shinohara[1], Toshihiko Kanazawa[2], Eiichiro Araki[3], Kiyoshi Suyehiro[3], Hajime Shiobara[4], Tomoaki Yamada[5], Kazuo Nakahigashi[6], Hitoshi Mikada[3], Yoshio Fukao[7]

[1] ERI, Univ. Tokyo, [2] ERI, Tokyo Univ, [3] JAMSTEC, [4] OHRC, ERI, Univ. Tokyo, [5] ERI, Univ. of Tokyo, [6] ERI, [7] Earthq. Res. Inst., Univ. of Tokyo

IFREE/JAMSTEC

In 2000 and 2001, the seafloor borehole seismological observatories WP-1 and WP-2 in the northwestern Pacific were successfully installed to fill observational gaps for global seismological networks. The WP-1 site is in the west Philippine Basin west of the Kyushu-Palau Ridge. The WP-2 observatory is situated on a normal oceanic Mesozoic crust in the northwestern Pacific Basin. Both the observatories have broadband seismometers (Guralp CMG-1T).

The WP-2 observatory was activated in October 2000 using an ROV KAIKO. In August 2001, the KAIKO re-visited the WP-2 site and we obtained about three-months continuous data (Oct. 29th, 2000 - Jan. 27th, 2001). The KAIKO visited the WP-2 site again in June 2002 and approximately eleven-months continuous data (Aug. 3rd, 2001 - Jun. 29th, 2002) were retrieved. The observation at the WP-1 was started in March 2002 using the KAIKO. A re-visit of the WP-1 site was carried out in October 2002. We succeeded to recover the data from the WP-1 for period of almost half of year (Mar. 26th, 2002 - Oct. 6th, 2002). At present, both observatories continue the observation.

The long-term variations of broadband seismic noise spectra (3mHz - 10 Hz) in the northwestern Pacific Basin were revealed. The noise levels at periods of greater than 10 s are stable all the year round for both the stations. The vertical component of the WP-2 has the noise levels of -145 db (re: $1 \text{ m}^2/\text{s}^4/\text{Hz}$). The noise levels of the horizontal component in the WP-2 are lower than that of the vertical component (-160 db at periods above 10 s). Because it is estimated that the vertical sensor has damage, we switched to the alternative seismometer. It is found that the noise levels of the vertical component at the WP-1 reach -180 db at periods between 10 s and 100 s. However the horizontal records from the WP-1 are relatively noisy. There is a possibility that the sensor has a problem. Temporal small variations of noise levels for periods around a few seconds are seen in both the stations. The WP-1 station has large noises in summer and fall. On the other hand, the noise levels of the WP-2 become large in winter. A maximum fluctuation of the noise levels is 10 db. This small variation may correspond to geographical positions of the stations; the noise levels may be affected by regional weather. As a result, ambient seismic noises of the borehole observatories are comparable to those of quiet land stations. Due to the low seismic noise environment, many events were recorded in the records.