Ae-004 Room: C501 Time: June 6 9:45-10:00

OHP Network: WP-2 and WP-1 Borehole Broadband Seismological Stations

Masanao Shinohara[1], Toshihiko Kanazawa[2], Masashi Mochizuki[3], Eiichiro Araki[4], Hitoshi Mikada[4], Kiyoshi Suyehiro[4], Kenji Hirata[5], Tomoaki Yamada[3], Yuka Kaiho[4]

[1] ERI, Univ. Tokyo, [2] ERI, Tokyo Univ, [3] ERI, Univ. of Tokyo, [4] JAMSTEC, [5] DSR, JAMSTEC

http://ms2.eri.u-tokyo.ac.jp

Ocean Hemisphere Project (OHP) planned to install four ocean floor borehole geophysical observatories in three areas of the western Pacific. The main objective of installation of borehole stations is to obtain high quality data for a high-resolution image beneath the western Pacific. Installation of a seismic observatory (WP-2) in the northwestern Pacific Basin was completed in August, 2000. From the preliminary data from installed borehole seismometers, we found that boreholes at the sea floor provide quiet environments for seismic observation. For completion of the network construction, installation of a seismic station in the Philippine Basin (WP-1) is scheduled in April, 2001 during ODP Leg 195.

Ocean Hemisphere Project (OHP) planned to install four ocean floor borehole geophysical observatories in three areas of the western Pacific. The main objective of installation of borehole stations is to obtain high quality data for a high-resolution image beneath the western Pacific. Two borehole geophysical observatories (JT-1 and JT-2) on the landward slope of the Japan Trench were successfully installed in July and August, 1999. In addition, installation of a seismic observatory (WP-2) in the northwestern Pacific Basin was completed in August, 2000. From the preliminary data of JT-1 and WP-2, we found that boreholes at the sea floor provide quiet environments for seismic observation. For completion of the network construction, installation of a seismic station in the Philippine Basin is scheduled in April, 2001 during ODP Leg 195. In August 2000, the new borehole seismological observatory, called WP-2, at ODP Site 1179 in the northwestern Pacific basin was installed successfully during the ODP Leg191. Two broadband seismometers (CMG 1T) are placed near the bottom of the hole in igneous basement. The signals are digitized in the sensor packages and sent in digital form to the sea floor packages. The seafloor package called MEG serves to combine the digital data from the two seismometers to a single serial data stream. The data are stored in a digital format in a separate module, called SAM, via a RS232C link. The SAM has four 18 Gbyte SCSI hard disks equivalent to more than 6 channels of one year long continuous data of 24 bit dynamic range at 100 Hz sampling rate. The SAM also provides a communication link to the borehole system. We can make a check of the status of the observatory via a "SAM-ROV interface" that enables RS-232C communication between the SAM and the ROV at an ROV visit. Electric power is supplied from the battery system called Sea Water Battery (SWB). The SWB can supply up to about 24 W with more than 400 kWh capacities. Its energy comes from electrolytic dissolution of the magnesium anode. All the sea-floor instruments, the MEG, the SAM and the magnesium anode of the SWB are designed to be replaceable by ROV or submersible. Installation of the WP-2 seismometer system to Hole 1179E was performed from 22nd to 24th, Aug, 2000. Hole 1179E is 475 mbsf deep and has a basalt section below 377.2 mbsf. The seismometers were grouted at a depth of about 460 mbsf in a basement layer. After the cementing, assembly of the battery frame, called PAT, was lowered. In October 2000, KAIKO, an ROV belonging to the Japan Marine Science and Technology Center, visited Site 1179 to activate the WP-2 observatory. KAIKO dive #175 was carried out on 29th, October. First, ROV connected the SWB to the system using the UMC for check of the whole system. After connecting the SWB to the system, ROV made a RS232C link between the WP-2 system and a computer on the mother ship KAIREI using the SAMROV interface. We could confirm the WP-2 has no problem by this check. The SWB has a data logger for recording voltages and currents of the system. ROV recovered the SAM on PAT and the data logger of the SWB. The SAM has data from borehole seismometers with 1 hour long. Seismic noise of WP-2 station is enough low for earthquake observation. From the data of the SWB system, we could confirm that the SWB generates power.