One year observation by "New" multidisciplinary deep seafloor observatory off Hatsushima Island in Sagami Bay

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Real time multidisciplinary deep seafloor monitoring at a cold seepage site at a depth of 1170m off Hatsushima Island in Sagami Bay has been carried out for about a year since renewal of the cable-connected observatory in March 2000. New system is equipped with an ADCP, a precise pressure gauge, a transmissometer and a gamma ray sensor, adding to the sensors of old system and several new observational results are being obtained. Main feature of the observatory is the extendibility by underwater wet mateable connectors. Far more advances in revealing phenomena on the deep seafloor through the observation and in the development of next-generational instruments are expected by utilizing the observatory.

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The ADCP is able to measure seawater current whose altitude is from 12 m to 490 m from the seafloor. There were semidiurnal changes in horizontal components. Disturbance of current velocity in both horizontal components seems to propagate from top to bottom and the current directions of the top layer and bottom layer at same time tend to be opposite. Increase of seawater current velocity correlated well to decrease of light transmission rate of the seawater, i.e. increase of suspended matters, which seem to be the sediments that was stirred into the seawater from the seafloor and was moved by the current. Amplitudes of horizontal components of seismometer, especially of north-south component, increased as the current velocity near the seafloor increased. On the other hand, amplitude of hydrophone does not always correlated with the bottom current. Some parts of kHz band data of hydrophone are recorded on the sound tracks of DVCAM tapes with video images, in addition to 24bit/200Hz digital data. Explosive sounds were accompanied with some events that have been detected by OBSs of both this observatory and ERI's off ITO system. Sources are not clarified yet, but they may be artificial.

Two probes of sub-bottom thermometer of the new observatory were placed separately inside and outside of the clam colony in the same way as the former system. At the former observatory, the temperature gradient inside the colony was larger than inside the colony just after the deployment, but at the new observatory temperature gradients do not differ so much as at the former one. Semidiurnal changes of sub-bottom temperatures correlating to ocean tides that had been observed by the former observatory have not been observed. These differences may show that at the new observatory, which is located about 40m north of the former one, environment caused by cold seepage is different from that at the former one, such that cold seepage may not be so active.

Main feature of the observatory is the extendibility by underwater wet mateable connectors (five electrical connectors and four optical connectors). . Four of five electrical UMCs are for additional 19.2kbps serial ports. Sensors whose interface matches those specifications can be attached to the observatory on the seafloor. The other electrical UMC and all optical UMCs are directly connected to the electro-optical submarine cable which leads to the land station. By utilizing these optical UMCs, developments of optical fiber sensors, such as optical fiber seismometers, are also possible. Before deployment, a 5m cable, on both ends of which optical UMCs were molded, was attached to the observatory in order to measure optical loss of the UMCs at the land station by making a loop-back fiber path. Optical loss of one UMC was about 1dB including splice losses of the fiber inside the underwater telemetry unit that is almost same as those of connectors commonly used on land. By mating test of UMC carried out by ROV "Hyper-dolphin", optical loss was almost the same.

As there are several problems with the new observatory, adjustments through checking data including recovery and re-deployment are planned in near future. After the adjustments, far more advances in revealing phenomena on the deep seafloor through the observation and in the development of next-generational instruments are expected by utilizing the observatory.