

Acoustic characteristics of the acoustic transducers for seafloor geodetic observation

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Institute of Industrial Science, University of Tokyo and Hydrographic and Oceanographic Department, Japan Coast Guard have been constructing the geodetic observation network on the seafloor around Japan. The observation network, which consists of eighteen seafloor geodetic reference stations, has been built along the ocean trench regions.

The observation results were accumulated as the observations have been routinely repeated. Issues and knowledge that we have through the observations should be fed back to the system and further observation for improvement. One of such issues is one inherent in the acoustic transducers. Cylindrical acoustic transducers are employed both on the ship-board system and on the seafloor transponder. Coded sinusoidal acoustic wave with 15 cm wave length is used as the ranging signal. This wave length is compatible to the dimension of the cylindrical transducer. This implies that possible ranging error is caused depending on the incident angle of the acoustic signal to the transducer.

Tank tests were conducted to evaluate the phase response of the newly developed acoustic transducer in advance of introducing it to the observation system. Ranging procedure has repeated by receiving a signal transmitted from the transducer with hydrophone at points keeping constant distance from the transducer. Evaluation of the phase response of the current transducer was also performed under the same conditions in order to compare these responses directly. Some corrections to retain continuity in the seafloor geodetic observation could be deduced from these comparisons.