Direct Path Acoustic Ranging on the deep sea floor with the baseline length of 5 km

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In hydrographic department, we have been developing a technique to observe the sea floor crustal deformations by using the technique of direct path acoustic ranging between two fixed points on the sea floor. The observation system is called SeaFAR, which has already succeeded in the measurement of 1 km baseline straggling over the spreading plate boundary in East Pacific Rise for one year in 1997-1998..

In 2001, we observed with the baseline of 4.5 km length at the sea bottom in Sagami Nada, near Japan at the depth of about 1,400 meters. For this purpose, we have replaced the transducer of SeaFAR and have employed 10-20 kHz chirp wave as the ranging signal. Also we have attached the CTD sensor at one station to monitor the changes of salinity. The instruments were deployed and recovered by using Survey Vessel KAIYO. The 73 days observed data were successfully obtained with the repeat interval of one hour. Also the temperature changes were recorded at both stations and at the center point of baseline with 9 thermometers in total.

In preliminary analysis, the raw observed travel time data is corrected by using the changes of water temperature observed with single sensor and the changes of baseline length is estimated under the assumption of constant salinity. The scatter of repeat measurement is about 10 cm. It is necessary to challenge more sophisticated estimation of baseline length by using the data of thermometer array and CTD sensor.