Development of a seafloor positioning system with GPS-acoustic link

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The seafloor crustal deformation data will contribute significantly to understanding the nature of the tectonic processes at the plate boundaries. We have developed a seafloor positioning system with GPS-acoustic link. This system consists of two main components; (1) the surface positioning by differential GPS and (2) the precise acoustic ranging between the surface and seafloor references. We performed preliminary positioning tests at two different depth of about 65m and 1350m. In these experiments, simple 1-D structure models are assumed for the sound speed in the sea. The results show that the positions of the seafloor references are estimated with about 15 cm accuracy in horizontal components. More accurate positioning is possible by improving the system.