Multipath effect on the accuracy of long baseline KGPS positioning

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Hydrographic and Oceanographic Department is carrying out seafloor geodetic observations with a survey vessel, which combines the kinematic GPS and acoustic ranging techniques. In our KGPS analysis, we usually utilize multiple land stations as references for obtaining the trajectory of an antenna on the survey vessel at sea.

In the past applications, there found many cases where the accuracy in kinematic solutions seems to depend on types of antennas and/or receivers rather than baseline lengths or geographical relations between the vessel and land stations. Comparisons between kinematic results on a vessel obtained from different land reference stations show that the accuracy of those from antennas with the higher multipath resistance performance is clearly better than those with the lower performance: results from the lower one often carry large time drifts, whose temporal patterns are similar even between for the land stations far apart with each other.

In order to investigate more specifically the effect of multipath on the long range KGPS, we made comparative experiments in the compound of Shimosato Hydrographic Observatory, Wakayama Prefecture, between for different antenna types as land references during the period of our seafloor geodetic observation off Tokai region. The trajectories obtained from this experiment were also compared with those obtained from a nearby GEONET station. Results from these comparisons also show that the antenna that has higher multipath performance gives better accuracy.

From these examinations, we conclude that one of the major causes for deteriorating the accuracy of long range kinematic GPS is the multipath effect.