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Accuracy evaluation of Kinematic GPS analysis based on the difference of the IGS products (follow-up report)

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The Philippine Sea plate subducts beneath the southwest Japan from the Nankai Trough with a rate of about 4-6 cm/year, where great interplate earthquakes have repeatedly occurred every 100-150 years. To clarify the mechanism of earthquake occurrence at such subduction zones, we require the geodetic data obtained from not only onshore area but also offshore area. However it is difficult to estimate the plate interaction in offshore areas, due to the poverty of those data. For this issue, we have conducted seafloor geodetic observation using GPS/Acoustic techniques around the Nankai Trough since 2004. In this system, we estimate the position of a surveying vessel by Kinematic GPS analysis and measure the distance between the vessel and the benchmark on the seafloor by Acoustic measurements. Next, we determine the location of the benchmark and detected crustal movement on the seafloor. Recently, a number of research institute have conducted seafloor geodetic observation after earthquake occurred in offshore area (Tadokoro et al., 2006), and then speedy solution is desired from a viewpoint of not only scientific research but also disaster mitigation. Although we use the IGS final product for its accuracy, the latency of that is longer, about 13 days or more. On the other hand, the IGS ultra-rapid product is updated every 6 hours with the delay of 3 hours. In the previous study, we compared the kinematic GPS solutions using the IGS final and ultra-rapid products. The rover GPS site was located on the roof of a building at Nagoya University and 5 fixed GPS sites were located on the roof of other buildings whose baseline lengths were 30-150 km. Though the standard deviation of the difference between final and ultra-rapid solutions increases with increasing baseline length, which is about 1.6 mm in 150 km baseline. This result showed that the difference was not significant for seafloor geodetic observations. In this study, we investigate the kinematic GPS solutions based on the difference of the IGS products using GPS data obtained from seafloor geodetic observations, and assess the accuracy and effectivity of the IGS ultra-rapid product.

Keywords: Kinematic GPS, Seafloor geodetic observation, IGS products