

Kinematic Precise Point Positioning (PPP) Solution for Hydrographic Applications

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SUMMARY

Precise Point Positioning (PPP) is one of the major research areas in surveying in recent years to obtain cost effectively coordinates using one dual frequency GNSS instrument. The purpose of this study is to investigate the accuracy of the kinematic PPP solution using Bernese software for hydrographic applications. This PPP solution was compared with the double-difference solution from Bernese software. A Virtual SAPOS (SAtellitenPOSitionierungsdienst der deutschen Landesvermessung) reference station was considered as a reference station. Two kinematic trajectories have been observed within project "HydrOs (Integrated Hydrographic Positioning System) on the Rhine River, Duisburg, Germany. This project is launched in co-operation of the department M5 (Geodesy) of the German Federal Institute of Hydrology (BfG) and the Institute of Engineering Geodesy at the University of Stuttgart (IGS). The first kinematic trajectory shows a standard deviation for kinematic PPP solution of 6 cm in East, 2.1 cm in North and 6.8 cm in height. If 5% of the measurements are eliminated as outliers, the standard deviation values for a confidence level of 95% ($SD_{(95\%)}$) are 5 cm in East, 1.2 cm in North and 5 cm in height. The second trajectory which started with 40 minutes of quasi-static observation time (non-moving vessel) achieves a more precise solution. The standard deviation values of all measurement are 1.7 cm in East, 2.6 cm in North and 4.9 cm in height. For a confidence level of 95%, the PPP solution provides a standard deviation ($SD_{(95\%)}$) of 1.5 cm for East and North directions. Moreover, it delivers 3 cm for height.