

# The Study of Sky Condition Prediction and Combination Efficiency Estimation about Multi-GNSS

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The Global Navigation Satellite System (GNSS) is widely used in military and civilian applications because of the high-precision services of positioning, velocity and time-of-flight (PVT) at any time and any place. At present, GNSS include the GPS of the United States, the GLONASS of Russia, the Galileo of European Union and the Beidou of China. Due to the rapid development and diversity of GNSS, the positioning efficiency of multi-GNSS is an important information for user reference when surveying.

In this study, the sky condition of the project area is predicted by the STK software. It is expected that the best location and period of observation can be provided to improve the observation efficiency according to simulated calculate the satellite geometric distribution and satellite visible number. Based on mentioned above, the observation efficiency can be improved. In addition, this study conducts a study on the positioning effectiveness of GNSS by actual observation data through different combination of satellite systems, ephemeris and weathers. In the discussion of sky condition prediction, the prediction is successfully carried out. In the discussion of GNSS combination, the results show that the GPS satellite system is relatively stable and highly accurate compared to other satellite systems. The relative positioning accuracy of multi-GNSS with GPS satellite system compared to without GPS system can improve 14ppm. In the discussion of different ephemeris, the short baselines can produce consistent results with relative accuracy in either broadcast or precision ephemeris. In the discussion of weathers, the relative accuracy of observations on a sunny day can be improved by 4ppm compared to a rainy day.

Keywords: GNSS, sky condition prediction, combination efficiency