

Determination of GNSS RTK accuracy in various environments

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SUMMARY

Real-Time Kinematic (RTK) is a well-established and versatile Global Navigation Satellite Systems (GNSS) technique widely used in the surveying and geospatial industries. Users are generally aware of GNSS measurement errors caused by satellite geometry, signal transmission, and the local environment, as well as the methods used to mitigate these errors. Most errors are minimized using robust mathematical algorithms, such as double differencing and On-the-Fly techniques, along with appropriate models to account for factors like antenna phase centre and tropospheric delay. However, errors caused by the local environment, such as signal multipath and obstructions from man-made structures or vegetation, remain challenging to address.

This study investigates how reduced signal availability (satellite geometry) in challenging environments affects RTK coordinate accuracy. It quantifies these errors in areas with poor sky visibility and examines the impact of using different satellite constellations, including GPS+Galileo+BDS (GEC), GPS+BDS (GE), and GPS-only (G) configurations.