

Abstract

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Dynamic Duo – Combined GPS/GLONASS Receivers in Urban Environments

High-sensitivity (HS) GNSS receivers have flourished in the last decade. A variety of advances in signal-processing techniques and technologies have led to a thousandfold decrease in the minimum useable signal power, permitting use of GNSS, in particular GPS, in many environments where it was previously impossible. Despite these recent advances, the issue of availability remains: in many scenarios there are simply too few satellites in view with detectable signals and a good geometry to compute a position solution. Of course, one way to improve this situation is to increase the number of satellites in view. GLONASS has been undergoing an accelerated revitalization program of late, such that there are currently more than 20 active GLONASS satellites on orbit. The combined use of GPS and GLONASS in a high-sensitivity receiver is a logical one, providing a near two-thirds increase in the number of satellites available for use. The urban canyon environment is one in which the issue of signal availability is particularly important. The presence of large buildings leads to frequent shadowing of signals, which can only be overcome by increasing the number of satellites in the sky. Even if sufficient satellites are visible, the geometric dilution of precision can often be large, leading to large errors in position. This work focuses on the advantages of using a combined GPS/GLONASS receiver in comparison to a GPS-only receiver in urban canyons. The target application is location-based services, so only single frequency (L1) operation is considered. We collected and assessed vehicular kinematic data in a typical North American urban canyon, using a commercially available high-sensitivity GPS-only receiver, a commercial survey-grade GPS/GLONASS receiver, and a state-of-the-art software receiver capable of processing both GPS and GLONASS in standard high-sensitivity modes.