

Application of GPS/GLONASS Combination to the Revision of Digital Map

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ABSTRACT

GPS in the United States and GLONASS of the old Soviet Union are used currently as satellite navigation systems. Plans are being made to use the Galileo satellite system in Europe, and these plans focus on a combined application of the satellite navigation systems. In this study, we examined the possibility of effective application of a combination of GPS/GLONASS to Digital Map revision of urban areas, where 3-dimensional positioning is impossible with GPS alone. We analyzed the 3-D coordinate deviation of a GLONASS satellite by integration interval and compared it with GLONASS satellite coordinates in precise ephemerides by transforming it into WGS84. We also programmed DGPS/DGLONASS, analyzed 3-D positioning accuracy by static surveying and kinematic surveying with Ashtech Z18 receivers and Legacy receivers, and then compared it with GPS surveying.

As a result, we are able to decide the integration interval for producing GLONASS satellite coordinates in navigation and geographical information and construct a GPS/GLONASS data processing system by developing a DGPS/DGLONASS positioning program. If more than four GLONASS satellites are observed, the accuracy of DGPS/DGLONASS is better than that of DGPS positioning. As a result of kinematic surveying in a congested urban area with skyscrapers, we discovered that DGPS/DGLONASS combination is very effective. The Galileo system can be used to revise Digital Maps in cities effectively.

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