Investigations Concerning the Reliability and the External Accuracy of GPS Real-Time Measurements

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ABSTRACT

In a local area network for engineering purposes the external accuracy of different RTK-techniques is analysed in detail. Three different solutions for the network are produced by varying the kind of the necessary reference station. First of all a local reference station resulting in very short baselines is used for the RTK-measurements. A second solution for the network is produced by using the nearest SAPOS reference station (SAPOS: Satellite Positioning Service of the German National Survey) resulting in an average baseline length of about 6.8km. At least so called virtual reference stations – derived from a network solution of the surrounding SAPOS-stations – are used for a third RTK-solution.

For each solution every point of the network is occupied at least six times by using different ambiguity solutions, by varying the observation time after the successful initialisation from 10sec up to 60sec and by using a different satellite geometrie. The three network solutions are computed by using strong adjustment procedures as well for the horizontal positions as for the height component of the points of the network. Hereby the RTK positions and heights together with the corresponding variance-covariance matrices are introduced as pseudo-observations. Finally these adjustment results are analysed and compared to a more precise network solution resulting from terrestrial measurements of very high accuracy.

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