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Real time Precise Point Positioning

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Current methods of satellite-based relative point determination (static) over long distances can provide a position accuracy of +/-2-3mm and a height accuracy of about +/-5-6mm. Practical surveying techniques however aim towards a reliable and reproducible quasi-real time solution with cm accuracy over short and middle distances under employment of small devices and at low data communication costs. Thus, the best possible accuracy in point determination and the underlying reference framework do not rank among the priority goals. This type of state-of-the-art GNSS point determination is based on reference station networks which provide us with sufficient information about the condition of the atmosphere or other systematic error sources. Cause we receive reference data transmitted by means of GSM or GPRS to the Rover (or also simulated (VRS)), we still speak about relative positioning. If we receive solely error models from the network to correct code and phase observations on zero-difference level, we speak about “Precise Point Positioning” (PPP). In post processing mode is the PPP an already successfully used procedure for the estimation of station coordinates since about 10 years. Thus the IGS (International GPS Service) uses the PPP as a final test for the consistency of the derived products. When introducing well-known station coordinates the inverse procedure can be used for the computation of the tropospheric propagation delay or for the additional estimation of exact station clocks (corrections to GPS-Time). In this presentation the necessary conditions for precise single-point determination in quasi-real time will be examined. Instead of models derived from local Reference Station Network data we use a suite of products freely available on the internet (e.g. precise satellite ephemerides, Ionosphere TEC models,...) and analyse their consistency and the achievable accuracy in point determination. The introduced predicted precise satellite clocks are generated by program GNSS-VC developed at our institute within a PhD-thesis (V.Broederbauer) focusing on precise GNSS Satellite Clock predictions.