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A closer look at the concept of regional clocks for Precise Point Positioning

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Under the precondition of at least two successfully tracked signals at different carrier frequencies we may obtain their ionosphere free linear combination. By introducing approximate values for geometric effects like orbits and tropospheric delay as well as an initial bias parameter N per individual satellite we can solve for the satellite clock with respect to the receiver clock. Noting, that residual effects like orbit errors, remaining tropospheric delays and a residual bias parameter map into these parameters, this procedure leaves us with a kind of virtual clock differences. These clocks cover regional effects and are therefore clearly correlated with clocks at nearby station. Therefore we call these clock differences, which are clearly different from clock solutions provided for instance by IGS, the “regional clocks”.

When introducing the regional clocks obtained from real-time data of a GNSS reference station network we are able to process the coordinates of a nearby isolated station via a PPP .In terms of PPP-convergence time which will be reduced down to 30 minutes or less, this procedure is clearly favorable. The accuracy is quite comparable with state of the art PPP procedures. Nevertheless, this approach cannot compete in fixing times with double-difference approaches but the correlation holds over hundreds of kilometers distance to our master station and the clock differences can easily by obtained, even in real-time.

This presentation provides preliminary results of the project RA-PPP. RA-PPP is a research project financed by the Federal Ministry for Transport, Innovation and Technology, managed by the Austrian Research Promotion Agency (FFG) in the course of the 6th call of the Austrian Space Application Program (ASAP). RA-PPP stands for Rapid Precise Point Positioning, which denotes the wish for faster and more accurate algorithms for PPP. The concept of regional clocks which will be demonstrated in detail in this presentation is one out of 4 concepts to be evaluated in this project.