Specificities of GLONASS pseudorange and phase processing in the Precise Point Positioning algorithms when combining with GPS

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The Precise Point Positioning (PPP) technique using the un-differenced GNSS observations and the precise IGS orbits and satellite clock products for geocentric coordinate determination is nowadays a frequently used alternative to differential processing approach. Recently are for PPP almost exclusively used the GPS code and phase observations. For application of data from other GNSS is necessary to enhance the models available for GPS by introducing and modifying additional specific procedures. We discuss the problems related to inclusion of GLONASS into the reduction process and combination with GPS in PPP approach. Quality of estimation of real-valued ambiguities from code and phase GPS and GLONASS un-differenced observations is examined and the specificities of the two GNSS are discussed. Next, the individual GPS PPP solution is extended by combination with GLONASS observations. The necessity of introduction of additional parameters for elimination of GLONASS inter-frequency hardware biases is demonstrated and the stability of these parameters is investigated. Finally, the effect of introducing GLONASS in the common coordinate adjustment using un-differenced GNSS data is discussed. All the procedures are examined by using the software package ABSOLUTE which is developed for the PPP GNSS processing at the Slovak University of Technology in Bratislava.