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Influence of SSR atmospheric corrections in PPP-RTK processing parameters.

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PPP (Precise Point Positioning) is a GNSS (Global Navigation Satellite Systems) method, based on SSR (State Space Representation) concept. Real-time PPP (RT-PPP) can also be improved using atmospheric corrections obtained from GNSS reference networks used to provide NRTK (Network Real-Time Kinematic) services, resulting in the so-called PPP-RTK. The main objective of this work is to study the RT-PPP and the optimized infrastructure in terms of costs and benefits to realize the method using atmospheric corrections. Therefore, different configurations of a dense and regular GNSS network existing in France, the Orpheon network, are used. This network has about 160 sites and is owned by Geodata-Diffusion (Hexagon Geosystems). Network topology was assessed by reducing the number of reference stations (up to 75%) using a sparse network configuration. PPP-RTK is realized using the PPP-Wizard 1.3 software and CNES (Centre National d'Etudes Spatiales) real-time products for orbits, clocks and phase biases of satellites. Tropospheric and ionospheric delays are estimated at the server side and provided to simulated users as SSR corrections. Ionospheric and tropospheric corrections are introduced as a priori parameters constrained in PPP-RTK. To generate ionospheric corrections, it was implemented an Inverse Distance Weighting (IDW) algorithm. Results show that receiver clocks offsets and ionospheric delays biases are close to be anti-correlated. In terms of solution's convergence to 10cm accuracy, even considering some drawback in vertical positioning, the improvements achieved in horizontal positioning, thanks to atmospheric SSR corrections, are promising and may be useful for applications that depend primarily on horizontal positioning.