

Validation of reference frame consistency of GNSS service products

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Abstract. In GNSS point positioning the coordinate reference frame of the positioning results is determined by the reference frame of the used GNSS service product. Examples of GNSS service products are broadcast ephemeris (for SPP), precise orbits, clocks and biases (for PPP, PPP-RTK) or (virtual) reference station observations with coordinates (for RTK, PPK).

In earth science applications and geomatics, consistency between the reference frame of point positioning results is of importance in analysis of coordinate differences and velocities. To ensure consistency of the coordinate reference frame between GNSS service providers, national agencies compute coordinates for the GNSS reference stations used by these providers. This approach ensures consistency of the national reference frame on the input side of the process that generates GNSS RTK service products.

The approach of computing only station coordinates is not suitable for GNSS service providers that provide GNSS service products for multiple countries and can only select one coordinate for each station. This holds for some GNSS RTK service providers, but especially for other GNSS point positioning techniques (SPP, PPP, PPP-RTK) where a global network of reference stations is used to compute the GNSS service products. Also the approach has some drawbacks for both providers and users, especially as the consistency of the reference frame that is provided by the GNSS service product to the end user is not validated.

This contribution will introduce two new approaches for reference frame validation of GNSS service products and their relation with the EUREF densification guidelines, including results of a first prototype assessing the consistency of a cross-border GNSS RTK service with the EPN realization ETRF2000 and consistency of a GNSS PPP service with the IGS realization IGB14.