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GNSS Reference Station Provider – How to deal with ITRF updates ?

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In 2015 a new ITRS Realization (most likely ITRF2013) will be issued. Regular ITRF updates are required for instance to integrate recently established reference stations to the ITRF and to improve site velocity estimates of already long time existing stations. Discussions how to optimally account for sudden coordinate shifts (e.g. caused by earthquakes) or periodical site motions (e.g. due to ground water flow, . . .) are always ongoing.

Regional GNSS reference services usually tie their reference site coordinates to an almost recent ITRF at a fixed epoch or to a continental frame aligned to a tectonic plate (in Europe ETRFxx (ETRS89)). Therefore, the coordinates established in difference mode by users of such a service refer to this providers frame. In general a new ITRF update does not require any urgent action by the reference station provider as users are mostly interested in stable global coordinates and fixed relations to the national datum. On the other hand, currently upcoming un-differenced GNSS precise positioning techniques allow for dm or even sub-dm accuracy in post-processing, via RT-correction streams or via SIS. These coordinates are referred to the frame of the precise orbit and satellite information, which is the most current ITRF at the epoch of date. Therefore PPP coordinates established in 2014 differ for example from ETRF-coordinates by about 60cm or by at least 30cm from ITRF coordinates which refer to epoch 2000,0.

This poster presentation aims to discuss how a GNSS reference station provider has to deal with an ITRF update in order to ensure on the one hand consistency of the user coordinates established in difference or PPP mode and to allow the user to obtain coordinates in the desired reference frame (most recent ITRF, ETRF, national datum). The required suite of actions includes changes of the reference site coordinates, the provision of transformation tools for post-processing users and the delivery of Real-Time RTCM corrections streams including transformation parameters between the most current ITRF and the ETRF or the local datum.