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Integration of Dense Velocity Fields in the ITRF: Quantification and Mitigation of Inconsistencies Between Individual Solutions

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The objective of the IAG Working Group “Integration of Dense Velocity Fields in the ITRF” is to provide a GNSS-based dense, unified and reliable velocity field globally referenced in the ITRF (International Terrestrial Reference Frame) and useful for geodynamical and geophysical interpretations. The WG is embedded in IAG Sub-Commission 1.3 “Regional Reference Frames” where it coexists with the Regional Reference Frame Sub-Commissions AFREF (Africa), APREF (Asia & Pacific), EUREF (Europe), NAREF (North America), SCAR (Antarctica), SIRGAS (Latin America & Caribbean). These IAG Regional Reference Frame sub-commissions are responsible for providing GNSS-based densified weekly solutions for their region. In addition, the ULR consortium is also a contributor to the WG. To obtain such a densified velocity field, the WG will combine the individual weekly solutions from different contributors and then stack these weekly combined solutions in order to derive a cumulative position and velocity solution as well as the associated residual position time series.
The preliminary weekly combinations include 8 individual solutions (AFREF, APREF, EUREF, NAREF (NGS, GSB), SIRGAS, IGS, ULR) and contain about two thousand stations in addition to the ITRF2008. The agreement between the solutions is promising and leads to weekly RMS ranging from 2 to 8 mm. However, this agreement is presently limited by inconsistencies at the modeling and meta data level: 1) the meta data need to be verified as systematic biases occur, probably due to wrong antenna eccentricities and 2) different antenna calibration models have been used by the contributors: some solutions use igs08.atx, while others use igs05.atx or even individual calibrations. In addition, an optimal rescaling of the covariance matrices during the weekly combination is still under investigation.
This poster will focus on the quantification and, if possible, the mitigation of these inconsistencies and on the improvement of the combination process.