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Towards a Dense Velocity Field for Central Europe

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Twelve measurement campaigns between 1994 and 2011 with epoch and permanent GNSS stations make the CEGRN network one of the most regularly and accurately surveyed networks for scientific applications. Recently, the CEGRN GNSS data have been reprocessed with consistent orbits and IGS05 antenna models. On the other hand, the EUREF Permanent Network (EPN) represents the backbone geodetic infrastructure for Europe and realizes the ETRS89 system prescriptions with the ETRF2000 reference frame. Recently EUREF prepared its densification of the ITRF2008 and the IGS08 reference frames and resulting in cumulative SINEX files: by stacking reprocessed weekly normal equation files from 1996 to present, high accuracy positions and velocities of IGS and EPN stations in Europe could be obtained in a consistent reference frame throughout the temporal range. It is finally worth noting that both the IAG Working Group on "Integration of Dense Velocity Fields in the ITRF" and the EUREF Working Group on Deformation Models encourage initiatives aiming at estimating velocities of GNSS sites in a rigorous manner, both for reference frame applications and 3D tectonic deformation problems.
Within this framework it is then natural to attempt a combination of the EPN and CEGRN networks with the intent to bring down to regional, i.e. Central European, scale the same standard of accuracy of the EPN long-term solution, without reprocessing the entire set of raw GNSS data. This paper presents the first results of the EPN+CEGRN combination: we review the common properties of the input SINEX files, the processing software Bernese 5.0 and CATREF, the adopted processing strategies and the results, in terms of positions, velocities and Helmert parameters. We discuss the pros and cons of three possible processing strategies: one consists in stacking the individual, weekly CEGRN campaign solutions with the cumulative EPN solution; the second consists in stacking the two cumulative solutions, CEGRN and EPN; the third consists in first building combined weekly solutions of the CEGRN campaigns with the corresponding weekly EPN SINEX files, and then stacking time-wise the combined solutions.