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Regional reference velocity model based on extended EPND solution for InSAR applications

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Abstract. EPN Densification (EPND) is a collaborative effort of 30 European Analysis Centers, which are delivering national scale GNSS processing results in SINEX format. The single AC contributions are metadata-harmonized and quality-checked, then a weekly combined series is generated, which enter into a multi-year combination. The EPND position and velocity product is updated each 50 weeks. The latest update uses input from GPSweek 1500 to 2200 (October 2008 – March 2022) and includes almost 3000 stations and published at the EPND web portal (https://epnd.sgo-penc.hu). The generated velocity field plays paramount role as input to various geoscience products and programs.

As a new key application EPND serves the GNSS reference for the InSAR-based product of the European Ground Motion Service (EGMS). In EGMS everything from landslides and infrastructure deformation to volcanoes and tectonic movements is measured in a consistent, standardized manner in a well defined reference frame exploiting the synergies between GNSS and InSAR. For this purpose a grided GNSS velocity model is implemented, which represents the long wavelength part of the EGMS ground motion model. As EPND has data gap over some territories a so called assisted EPND solution is generated, where the velocity product of the Nevada Geodetic Laboratory (NGL) is also involved. The NGL solution provides unique opportunity for quality checks at overlapping stations and also to fill in gaps, where no EPND solution is accessible.

The presentation will review the methodology and input data used to produce the assisted EPND grid and also provides examples to show its performance. We implemented the classical least-squares collocation approach in a remove-restore process adding special features to better model the trend in the input data. Low-pass filtering was also deployed to generate a solution well representing the long wavelength part of the velocity field needed for EGMS.