

EGU22-9733

<https://doi.org/10.5194/egusphere-egu22-9733>

EGU General Assembly 2022

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## EGMS: a New Copernicus Service for Ground Motion Mapping and Monitoring

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Satellite interferometric SAR (InSAR) has demonstrated to be a powerful technology to perform millimeter-scale precision measurements of ground motions. The European Ground Motion Service (EGMS), funded by the European Commission as an essential element of the Copernicus Land Monitoring Service (CLMS), constitutes the first application of the InSAR technology to high-resolution monitoring of ground deformations over an entire continent, based on full-resolution processing of all Sentinel-1 (S1) satellite acquisitions over most of Europe (Copernicus Participating States).

Upscaling from existing national precursor services to pan-European scale is challenging. EGMS employs the most advanced persistent scatterer (PS) and distributed scatterer (DS) InSAR processing algorithms, and adequate techniques to ensure seamless harmonization between the Sentinel-1 tracks. Moreover, within EGMS, a Global Navigation Satellite System (GNSS) high-quality 50 km grid model is realized, in order to tie the InSAR products to the geodetic reference frame ETRF2014.

The millimeter-scale precision measurements of ground motions provided by EGMS will enable mapping and monitoring of landslides, subsidence and earthquake or volcanic phenomena all over Europe, and the stability of slopes, mining areas, buildings and infrastructures. The first release of EGMS products will be in March 2022, with annual updates to follow.

To foster as wide usage as possible, EGMS foresees tools for visualization, exploration, analysis

and download of the ground deformation products, as well as elements to promote best practice applications and user uptake.

The new European geospatial dataset provided by EGMS will hopefully also stimulate the development of value-added products/services for the analysis and monitoring of ground motions and stability of structures based on InSAR measurements, as well as other InSAR products with higher spatial and/or temporal resolution.

This work will describe all the qualifying points of EGMS. Particular attention will be paid to the characteristics and the accuracy of the realized products, ensured in such a huge production by advanced algorithms and quality checks.

In addition, many examples of EGMS products will be shown to discuss the great potential and the (few) limitations of EGMS for mapping and monitoring landslides, subsidence and earthquake or volcanic phenomena, and the related stability of slopes, buildings and infrastructures.