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A digital twin for geophysical extremes: interim results from the DT-GEO project

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The DT-GEO project (2022-2025), funded under the Horizon Europe topic call INFRA-2021-TECH-01-01, is implementing an interdisciplinary digital twin for modelling and simulating geophysical extremes at the service of research infrastructures and related communities. The digital twin consists of interrelated Digital Twin Components (DTCs) dealing with geohazards from earthquakes to volcanoes to tsunamis and that harness world-class computational (FENIX, EuroHPC) and data (EPOS) Research Infrastructures, operational monitoring networks, and leading-edge research and academic partnerships in various fields of geophysics. The project is merging and assembling latest developments from other European projects and EuroHPC Centers of Excellence to deploy 12 DTCs, intended as self-contained containerised entities embedding flagship simulation codes, artificial intelligence layers, large volumes of (real-time) data streams from and into data-lakes, data assimilation methodologies, and overarching workflows for deployment and execution of single or coupled DTCs in centralised HPC and virtual cloud computing Research Infrastructures (RIs). Each DTC addresses specific scientific questions and circumvents technical challenges related to hazard assessment, early warning, forecasts, urgent computing, or geo-resource prospection. This presentation summarises the results form the two first years of the project including the digital twin architecture and the (meta)data structures enabling (semi-)automatic discovery, contextualisation, and orchestration of software (services) and data assets. This is a preliminary step before verifying the DTCs at 13 Site Demonstrators and starts a long-term community effort towards a twin on Geophysical Extremes integrated in the Destination Earth (DestinE) initiative.

Topic

Needs and solutions in scientific computing: Digital Twins

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