BEYOND geObservatory: an application for the timely monitoring of geohazard related ground deformation

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The BEYOND Center of Excellence of the National Observatory of Athens offers Earth Observation based services for monitoring natural disasters and participates in CEOS. BEYOND has a dedicated services pillar for monitoring geohazards from space. The cornerstone of the activity is geObservatory, an operational application for the timely mapping of ground deformation. geObservatory (http://beyond-eocenter.eu/geohub) is activated in major geohazard events, such as earthquakes, volcanic activity, landslides, etc. and automatically produces a series of Sentinel-1 based co-event differential interferograms (DInSAR) to map the surface deformation associated with the event. It also produces pre-event interferograms for benchmarking. The role of geObservatory is twofold: firstly, it provides to emergency management authorities with a rapid assessment of ground deformation, secondly it produces and maintains a global observatory of differential interferograms associated with catastrophic geo-events, which can potentially populate a tailored Data Cube to allow further processing and analytics.

geObservatory can be activated either manually by an authorized user, or automatically via connecting to the European-Mediterranean Seismological Centre (EMSC). In the latter case, criteria for the automatic activation of geObservatory are the magnitude of the earthquake and its depth. After the system is activated, the application automatically polls different Copernicus hubs, including the Greek Collaborative Ground Segment (https://sentinels.space.noa.gr/), to find the appropriate Sentinel-1 data for interferometry. When suitable pairs are identified, the satellite interferometry engine is triggered.

The application is orchestrated by a back-end server. Its main components include the Task Scheduling Service for initiating the request processing, finding and downloading the necessary satellite inputs and controlling the output production tasks, the Metadata Database that contains processing information, input and output metadata, and the ENVI sarscape module as the interferogram production engine. Interferometric products are finally made available for visualization and downloading through the geObservatory front-end on a free and open basis.

geObservatory has been tested throughout several activations in the past five months and have produced results on more than 25 occasions. The fully automatic application has proved very robust in swiftly producing ground deformation interferograms using big Sentinel data, towards a rapid first assessment of the damages.