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GIMS project: development of a low-cost system based on Galileo, Sentinel InSAR and inertial measurement units to monitor ground deformations

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Geological, hydrological, geotechnical, and environmental phenomena causing deformation of the Earth surface (subsidence, landslides, floods, sinking, tectonic activity) are happening at an increasing rate, also due to extreme events likely to be driven by climate change. These phenomena govern negative and sometimes destructive impacts on land, structures (dams, bridges, buildings), infrastructures (roads, railways, channels, pipelines, energy infrastructures, etc.), and ancient structures of artistic and cultural value (churches, ruins, archaeological sites, etc.); in addition, structures and infrastructures can undergo an obsolescence process eventually leading to a collapse.

The sensitivity of many areas in Europe to different hazards as well as around the world, as the recent landslides events related to the earthquake in Marche Region in Italy show, puts forward the need for an integrated and cost-effective geodetic monitoring capability. The purpose is to have detailed and timely knowledge of the geophysical behaviour of parts of the Earth surface, and its hindrances on structures, to mitigate casualties and injuries to the population, and better plan maintenance intervention. To set up such a geodetic monitoring capability of a portion of ground / structure, we need to be able to determine the time history of the coordinates of a number of its relevant points. A widespread adoption of geodetic monitoring requires a cost-effective approach, especially in terms of hardware to be deployed on-site.

GIMS (Geodetic Integrated Monitoring System) is an H2020/GSA-funded project aiming at developing, demonstrating and commercializing an advanced low-cost system based on EGNSS, Sentinel 1A/B SAR interferometry and other in-situ sensors, like inertial measurement units, to monitor ground deformations. The project will focus on monitoring landslides, subsidence and other environmental hazards that can only be identified by millimetric precision survey techniques.