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A sustainability model based on cloud infrastructures for core and downstream Copernicus services

Michele Manunta (1), Fabiana Calò (1), Claudio De Luca (1), Stefano Elefante (1), Jordi Farres (2), Fausto Guzzetti (3), Pasquale Imperatore (1), Riccardo Lanari (1), Wolfgang Lengert (2), Ivana Zinno (1), and Francesco Casu (1)

(1) IREA - CNR, Napoli, Italy (manunta.m@irea.cnr.it), (2) ESA - ESRIN, Frascati, Italy, (3) IRPI - CNR, Perugia, Italy

The incoming Sentinel missions have been designed to be the first remote sensing satellite system devoted to operational services. In particular, the Synthetic Aperture Radar (SAR) Sentinel-1 sensor, dedicated to globally acquire over land in the interferometric mode, guarantees an unprecedented capability to investigate and monitor the Earth surface deformations related to natural and man-made hazards. Thanks to the global coverage strategy and 12-day revisit time, jointly with the free and open access data policy, such a system will allow an extensive application of Differential Interferometric SAR (DInSAR) techniques. In such a framework, European Commission has been funding several projects through the GMES and Copernicus programs, aimed at preparing the user community to the operational and extensive use of Sentinel-1 products for risk mitigation and management purposes. Among them, the FP7-DORIS, an advanced GMES downstream service coordinated by Italian National Council of Research (CNR), is based on the fully exploitation of advanced DInSAR products in landslides and subsidence contexts. In particular, the DORIS project (www.doris-project.eu) has developed innovative scientific techniques and methodologies to support Civil Protection Authorities (CPA) during the pre-event, event, and post-event phases of the risk management cycle.
Nonetheless, the huge data stream expected from the Sentinel-1 satellite may jeopardize the effective use of such data in emergency response and security scenarios. This potential bottleneck can be properly overcome through the development of modern infrastructures, able to efficiently provide computing resources as well as advanced services for big data management, processing and dissemination. In this framework, CNR and ESA have tightened up a cooperation to foster the use of GRID and cloud computing platforms for remote sensing data processing, and to make available to a large audience advanced and innovative tools for DInSAR products generation and exploitation. In particular, CNR is porting the multi-temporal DInSAR technique referred to as Small Baseline Subset (SBAS) into the ESA G-POD (Grid Processing On Demand) and CIOP (Cloud Computing Operational Pilot) platforms (Elefante et al., 2013) within the SuperSites Exploitation Platform (SSEP) project, which aim is contributing to the development of an ecosystem for big geo-data processing and dissemination.
This work focuses on presenting the main results that have been achieved by the DORIS project concerning the use of advanced DInSAR products for supporting CPA during the risk management cycle. Furthermore, based on the DORIS experience, a sustainability model for Core and Downstream Copernicus services based on the effective exploitation of cloud platforms is proposed. In this framework, remote sensing community, both service providers and users, can significantly benefit from the Helix Nebula-The Science Cloud initiative, created by European scientific institutions, agencies, SMEs and enterprises to pave the way for the development and exploitation of a cloud computing infrastructure for science.

REFERENCES

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