Data and computing intensive applications in GENESI-DR

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GENESI-DR (Ground European Network for Earth Science Interoperations - Digital Repositories) is a European Commission (EC)-funded project, kicked-off early 2008 lead by ESA; partners include Space Agencies (DLR, ASI, CNES), both space and no-space data providers such as ENEA (I), Infoterra (UK), K-SAT (N), NILU (N), JRC (EU) and industry as Elsag Datamat (I), CS (F) and TERRADUE (I). GENESI-DR intends to meet the challenge of facilitating "time to science" from different Earth Science disciplines in discovery, access and use (combining, integrating, processing, . . .) of historical and recent Earth-related data from space, airborne and in-situ sensors, which are archived in large distributed repositories.

GENESI-DR provides a framework where data repositories can be easily integrated and users are given a single access point for discovery and access to heterogeneous data and processing resources. Processing services can be easily integrated as well so supporting the users in the analysis of the data. Coupled with high-performance and sizeable computing resources managed by Grid technologies, GENESI-DR provides indeed the necessary flexibility for building a virtual environment that gives transparent, fast, and easy access to data (even heterogeneous and dispersed among different archives), processing services, computing resources, and results. These characteristics make GENESI-DR an ideal platform for processing large amounts of heterogeneous data (e.g., satellite and in-situ data), developing services which require fast production and delivery of results, comparing approaches and fully validating algorithms. Security solutions adopted in GENESI-DR guarantee that only authorized users can access data, processing services and processing resources.

GENESI-DR is designed to support the need for an effective exploitation of the large archives. Among the different applications already integrated in GENESI-DR, in this presentation we will describe some results related to Differential SAR Interferometry (DInSAR). This is an effective technique to detect and monitor ground displacements with centimetre accuracy. The recent development of advanced DInSAR techniques, aimed at the generation of deformation time series, has led to the need of suitable environments and approaches for an effective exploitation of the large archive of SAR data acquired by the ERS, ENVISAT and RADARSAT satellites. Accordingly, we discuss, from a data access and processing point of view, some results obtained merging the robustness of an advanced DInSAR approach (namely the Small Baseline Subset (SBAS) algorithm proposed and developed by Italian CNR – IREA) with the high computing capability provided by the distributed infrastructure available through GENESI-DR. A similar analysis is currently performed using Cloud Computing resources.

As final remark, it is evident the importance that the presented distributed processing solution may have in scenarios as for the Supersite initiative, which is aimed at stimulating "an international and intergovernmental effort to monitor and study selected reference sites by establishing open access to relevant datasets according to GEO principles to foster the collaboration between all various partners and end-users".