

TELEIOS Annual Report



<http://www.earthobservatory.eu/>

Earth Observation data has increased considerably over the last decades as satellite sensors collect and transmit back to Earth many gigabytes of data per day. The aim of project TELEIOS is to increase the usability of the terabytes of satellite images lying dormant in archives by automating the relevant data management, integration and knowledge discovery tasks. The main innovation of project TELEIOS is the development of technology that goes beyond the current state of the art Earth Observation portals and satellite image information mining systems.

Summary of Activities

In the first 4 months of TELEIOS (September to December 2010), work has focused mainly on collecting the user requirements for our two use cases “A Virtual Observatory for TerraSAR-X data” and “Real-time fire monitoring based on continuous acquisitions of Earth Observation images and geospatial data”.

A Virtual Observatory for TerraSAR-X data



geometric accuracy.

The TerraSAR-X satellite has been developed by the German Aerospace Center (DLR) and EADS Astrium GmbH, an aerospace subsidiary of the European Aeronautic Defence and Space Company (EADS). It was put in orbit in June 2007, and it is currently in operation providing Synthetic Aperture Radar (SAR) imagery with a resolution of up to 1m and a unique

Our goal in the frame of the TELEIOS project is to develop a new generation of Earth Observation data mining and knowledge discovery concepts and modules for the TerraSAR-X Payload Ground Segment System that support user queries referring not just to product metadata (as it is common in all Earth Observation archive catalogues), but also to the information content of the satellite images. We plan to demonstrate the novel technologies developed in the TELEIOS project, for enhancing access to the TerraSAR-X image archive, thus amplifying data use, and also to prototype a more automated rapid mapping process.

Real-time fire monitoring and burnt area estimation

The problem of fire monitoring and management in Europe is very important. Almost every summer massive forest fires break out in several countries (e.g., Greece, Spain, Italy) leaving behind severe destructions in forested and agricultural lands, infrastructure and private property, and many losses of human lives.



In this use case, the goal is the development of a new generation of software for real-time fire monitoring and estimation of burnt areas that is based on the integration of information from satellite images and geospatial data. The images to be used in this use case are optical images obtained every 5-15 minutes from the imager SEVIRI on board the Meteosat Second Generation (MSG) satellites, and daily from the imager MODIS aboard the Terra and Aqua satellites.

The relevant TELEIOS software will advance the state of the art in similar technologies used in pre-operational services currently under development in the context of emergency management projects such as SAFER (Services and Applications for Emergency Response). We expect that the TELEIOS software will be used operationally for improved fire monitoring and estimation of burnt areas in Greece by our partner the National Observatory of Athens that also participates in SAFER.

User Involvement, Promotion and Awareness

To facilitate the involvement of the wider international Earth Observation community to our project, we organized the 1st TELEIOS User Community workshop at the premises of ESRIN (European Space Agency Research Institute) in Frascati, Italy on the 13th of October, 2010.

The workshop attracted 30 participants and turned out to be a very successful event. It gave us the opportunity to disseminate our plan of work to major players in Earth Observation such as the European Space Agency, the European Union Satellite Centre, national space agencies, and companies developing Earth Observation software. In addition, using modern requirements capture methodologies, the TELEIOS consortium identified an initial set of high-level requirements from relevant stakeholders and potential users of the TELEIOS software. This set of requirements, together with the requirements from our use cases, will be the basis for our work in year 2011 when the first version of the TELEIOS infrastructure will be developed.

Future Work

For the rest of the first year (January to August 2011), the project is concentrating on developing the first generation of the relevant technologies that would allow us to support the use cases described above. Our main goals in this period are:

- The design of the TELEIOS architecture and the development of the 1st version of the TELEIOS infrastructure.
- The development of array-based extensions to SQL for the representation and querying of low-level Earth Observation data, and their implementation in the column

store DBMS MonetDB. During the course of the project, new open-source releases of the MonetDB system are made available using, amongst others, TELEIOS-based improvements. The Oct 2010 feature release has been successfully shipped, with a bugfix release in Dec 2010.

- The development of knowledge discovery methods that allow the content of TerraSAR-X images to be discovered and captured in appropriate annotations.
- The development of data models and languages based on Semantic Web and OGC standards for representing and querying satellite image annotations, and their implementation in MonetDB.

Further Information

- [TELEIOS website](#)
- [TELEIOS Press Release of 11 Nov. 2010](#)
- [TELEIOS D8.1: Requirements specification of the TELEIOS User Community](#)