

Rheticus: Dynamic and continuous geoinformation service for critical infrastructure and environmental monitoring

by Giuseppe Forenza



Fig. 1 - Screenshot of the Rheticus platform.

The article describes some activities of the Rheticus geoinformation service for both critical infrastructure and environmental monitoring. Two particular applications of the cloud based platform are shown below.

Land and infrastructure monitoring is a key activity to ensure people's safety, environmental protection and the safeguarding of assets at all stages of the life cycle of infrastructure design, production and management.

Traditional campaigns for the regular monitoring of large and remote areas, however, employ considerable financial resources and time and are often complex to implement. The use of satellite technology allows overcoming these limitations and

obtaining frequent, accurate and accessible information thanks to the wide availability of spatial information, even in open data mode.

Among the different satellite technologies available, GPS and satellite images are widely used. In this context, Europe has decided to launch two constellations of satellites: Galileo and Sentinel. Galileo, currently under construction, which will have 30 GNSS satellites (Global Navigation Satellite System, the European GPS). The Sentinel satellites, of which four are already operational, are dedicated to Earth observation in the context of the Copernicus program and the data they collect are made available as open data.

Rheticus platform and Displacement

Images captured by the Sentinel satellites are at the basis of the monitoring services provided by the cloud platform Rheticus (www.rheticus.eu). Main

application of these services are dedicated to the monitoring of: the stability of infrastructures (dams, roads, pipelines, etc.); slope stability and subsidence; the quality of coastal marine waters; forest fires; anthropic changes of the territory.

The Rheticus cloud-based platform provides continuous monitoring services of the Earth's surface. Shifting from data provision to geospatial knowledge and geo-analytics, its services are delivered by subscription and worldwide.

Rheticus Displacement is one of the services provided through the www.rheticus.eu cloud platform.

The Rheticus Displacement geoinformation service offers monthly monitoring of millimetric displacements of the ground surface, landslide areas, the stability of infrastructures, and subsidence due to groundwater withdrawal/entry or from the excavation of mines and tunnels. The service also provides information on anthropic changes and infrastructural dynamics over the area where the infrastructure is established.

Rheticus Displacement provides a yearly historical analysis with monthly updates.

The mapping activity is made through the monitoring of points on the ground with high stability called Persistent Scatterers (PS). The PS is produced through the processing of the European Copernicus

Sentinel-1 satellite images or COSMO-SkyMed satellite data. Already used by main European infrastructures and transportation engineering companies, the service is targeted to: Infrastructures and works managers and builders; Public Administration; Planners & professionals in the territory.

This service was adopted by numerous customers in various application areas after only its first months of operation.

Two success stories:

- ANAS S.p.A. (National Autonomous Roads Corporation): analysis of slope stability to support the planning, design and monitoring of roads.
- MM S.p.A. (former Metropolitana Milanese): analysis of the instability of roads overlying pipelines for the detection of leaks in the water and sewage supply network.

Monitoring displacements of the sewer network in Milan (Italy)

The public sewerage network of Milan runs for approximately 1500 km. MM SpA (former Metropolitana Milanese SpA), the managing company of Integrated Water and Wastewater Services of the City of Milan, had been searching for a method to quickly detect ground surface movements caused by the structural defect of its collector that could affect the area above the primary network and adjacent areas.

Satellite radar interferometry was considered the most accurate and affordable survey method to prevent and identify possible failures of the sewage system, even in relation to the high traffic volume of metropolitan cities like Milan.

Thanks to the Rheticus platform (www.rheticus.eu) and its geoinformation service Rheticus Displacement, which processes the interferometric data of Sentinel satellites, 50 points with sensitive sub-vertical movements on 24 roads with heavy traffic were identified and will be investigated in a detailed field survey.

Rheticus Network Alert - A new user experience for water & sewer networks

Powered by Hexagon Geospatial's Smart M.App technology, Rheticus Network Alert has been launched at HxGN Live Conference – June 2017- Las Vegas.

The objective of Rheticus Network Alert is to assist integrated water and sewer networks managing companies in their maintenance and inspection activities.

Rheticus Network Alert simplifies the analysis of the Persistent Scatterers processed by Rheticus Displacement, providing information, filtered and applied directly to the network. Maintenance activity and inspection

priority, are simplified and the Network Alert Smart M.App provides the level of warning on each pipelines.

A growing network of Authorized Resellers.

The distribution of Rheticus services is global. To guarantee assistance to organizations, professionals and decision makers in any part of the globe, Planetek Italia is building a network of valued Authorized Distributors. Several companies in Europe, Central America, Africa and Asia have already joined its innovative business model and started offering Rheticus services to their markets. To be part of this network write at info@planetek.it

Rheticus awards

Developed by Planetek Italia, Rheticus has been already awarded in several competitions and prizes at Italian and international level, for the idea of shifting from the provision of data to the provision of services, intended as continuous access to information from the users. A few months after its official launch in April 2016, Rheticus

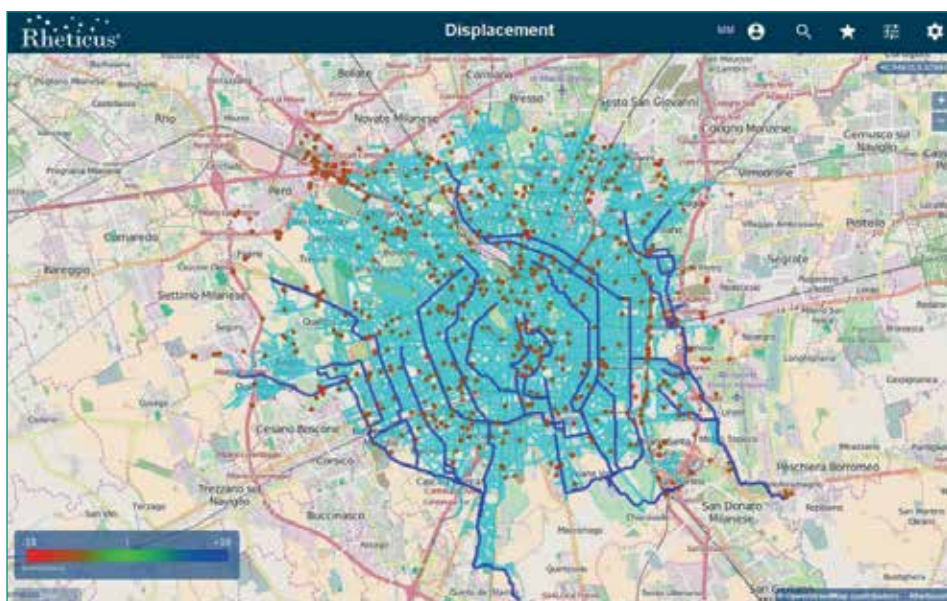


Fig. 2 – Displacements over the sewer Network in Milan, Italy.

was awarded:

- ▶ As “Application of the Year 2016” by OpenGeoData Association
- ▶ the “TIM Telecom Best Practices for Innovation 2016” during the Premio Best Practices for Innovation ceremony organized by Confindustria Salerno, Italy.
- ▶ It was also listed among finalists of the European EO product of the Year 2016 by the EARSC Association, and finalist of Hexagon Geospatial’s 2016 IGNITE Competition.

Rheticus was recently presented at ENGAGE 2017, the DigitalGlobe’s forum, in London, UK, and at HxGN Live Conference 2017, Las Vegas, Nevada.

Rheticus information and DEMO on <http://www.rheticus.eu>



Fig. 3 - Dynamic geoinformation about displacements over the sewer Network in Milan, Italy.

KEYWORDS

GEOINFORMATION SERVICE; CRITICAL INFRASTRUCTURE; ENVIRONMENT MONITORING; RHETICUS NETWORK ALERT

ABSTRACT

Using free & open images captured by the Copernicus Sentinel satellites, the Rheticus cloud-based platform delivers industry-focused geoinformation services, in form of dynamic maps, reports, geo-analytics and alerts for professionals, private companies and Public Authorities, involved in engineering, utilities, energy, mining, land planning, environment and land monitoring. Subscribed users can receive continuous information and analytics on the stability of infrastructures (dams, roads, railways, pipelines, etc.), slope stability and subsidence, the quality of coastal marine waters, forest fires and anthropic changes of the territory.

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Monitoring urban areas and critical infrastructure networks since 1990's

I.MODI® analyzes the displacements suffered by a structure and performs a **damage assessment**.

A WebGIS platform is adopted to distribute **results** to a wide range of **users**.



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