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COPERNICUS4REGIONS 2025

THE TRANSPORT INFRASTRUCTURE STABILITY MONITORING BY SATELLITE

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Planetek Italia | Italy



Construction of the S.S. 106 "Jonica" road | ANAS S.p.A.

ANAS S.p.A., the operator of Italy's national road and motorway network, faced a critical challenge in southern Calabria during the construction of a strategic realignment along the S.S. 106 "Jonica." By leveraging Rheticus® Displacement, a satellite monitoring service developed by Planetek Italia, ANAS successfully mitigated ground instability risks, ensuring prompt interventions and maintaining high safety standards at the construction site.

THE CHALLENGE

The construction of a 4-kilometer realignment along the S.S. 106 "Jonica" aimed to improve mobility in a region characterized by significant geomorphological fragility. Preliminary surveys revealed multiple technical challenges: unstable slopes, substantial groundwater inflows, and risks to buildings near the excavation areas. Despite adhering to the project timeline, a landslide on the Sant'Antonino promontory caused the partial collapse of a tunnel under construction and triggered severe ground deformations, threatening further instability. The key challenges included real-time monitoring of ground movements, ensuring the safety of workers and infrastructure, and preventing further incidents of instability during the project execution.

THE SPACE SOLUTIONS

To address these challenges, ANAS adopted Planetek Italia's Rheticus® Displacement service, in conjunction with terrestrial monitoring tools. This approach enabled continuous, proactive oversight of the affected area through:

- Historical Analysis of Sentinel 1 SAR Data: A 10-year archive of satellite data was analyzed to identify long-term ground movement trends, providing a deeper understanding of pre-existing risks.
- Continuous Monitoring: The integration of Corner Reflectors (CRs) at critical locations, such as near the Reggio Calabria tunnel portal, detected a 13 mm subsidence between June 5 and July 11, 2024. This enabled immediate stabilization interventions.
- Automated Alert System: Configurable thresholds and monthly notifications ensured continuous updates on ground movement, allowing rapid responses to anomalies.
- Integration with Ground-Based Sensors: Satellite data combined with terrestrial instrumentation provided a comprehensive view of the site, enhancing control and safety.
- Operational Training: Planetek Italia trained ANAS personnel to interpret Earth Observation data and apply it effectively in decision-making processes, maximizing the system's impact.

This integration of satellite technologies with ground-based tools offered an innovative and comprehensive approach to overcoming the project's complexities.



Rheticus® Displacement Service | Screenshot

THEMATIC AREA

Transports, Civil Infrastructure and Safety

REGION OF APPLICATION

Italy

SENTINEL MISSION USED

S1

COPERNICUS SERVICE USED

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THE BENEFITS AND THE BENEFICIARIES

The implementation of Rheticus® Displacement delivered tangible benefits for ANAS and the project stakeholders:

- Advanced Predictive Analysis: Historical trend studies improved planning and reduced exposure to unforeseen risks.
- Timely Interventions: Early detection of anomalies, such as the subsidence near the tunnel portal, enabled targeted actions, preventing larger-scale damages.
- Enhanced Operational Safety: The combination of space-based and terrestrial technologies significantly reduced risks to personnel and infrastructure.
- Continuous Updates: Monthly data updates provided a real-time overview of the situation, facilitating informed and rapid decision-making.
- Cost Efficiency: Early issue detection optimized costs by minimizing corrective interventions' time and resources.
- Skill Development: ANAS personnel gained expertise in leveraging advanced technologies, enabling the replication of this approach in other strategic contexts.

The direct beneficiaries include ANAS and local communities, which will enjoy safer infrastructure and improved mobility in a region with challenging terrain.

	TIER 1 SERVICE PROVIDER	TIER 2 PRIMARY USER	TIER 3 SECONDARY USER	TIER 4 END USER BENEFICIARIES
SERVICES AND BENEFITS	Sentinel-1	Historical Analysis of SAR Data: A 10-year archive of satellite data was analyzed to identify long-term ground movement trends	Integration with Ground-Based Sensors	Advanced Predictive Analysis
BENEFICIARIES	Planetek Italia	ANAS	Regional Authorities	National

EU POLICY / DIRECTIVE

Other

TYPE OF SERVICE PROVIDER

Commercial Service

TYPE OF FUNDING SOURCE

Other

USAGE MATURITY LEVEL

3



A FUTURE WITH COPERNICUS

The integration of Copernicus satellite technologies with terrestrial monitoring systems represents a cutting-edge operational model. For ANAS, this methodology provides a predictive, sustainable approach to managing complex projects, ensuring long-term infrastructure protection and resilience.



DID YOU KNOW?

Rheticus® Displacement employs satellite technologies to monitor ground movements with millimeter precision, offering constant updates and configurable alert thresholds. This solution has already proven effective in preventing collapses and ensuring the safety of complex projects in high-risk areas.

Acknowledgements

Rheticus® Displacement

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