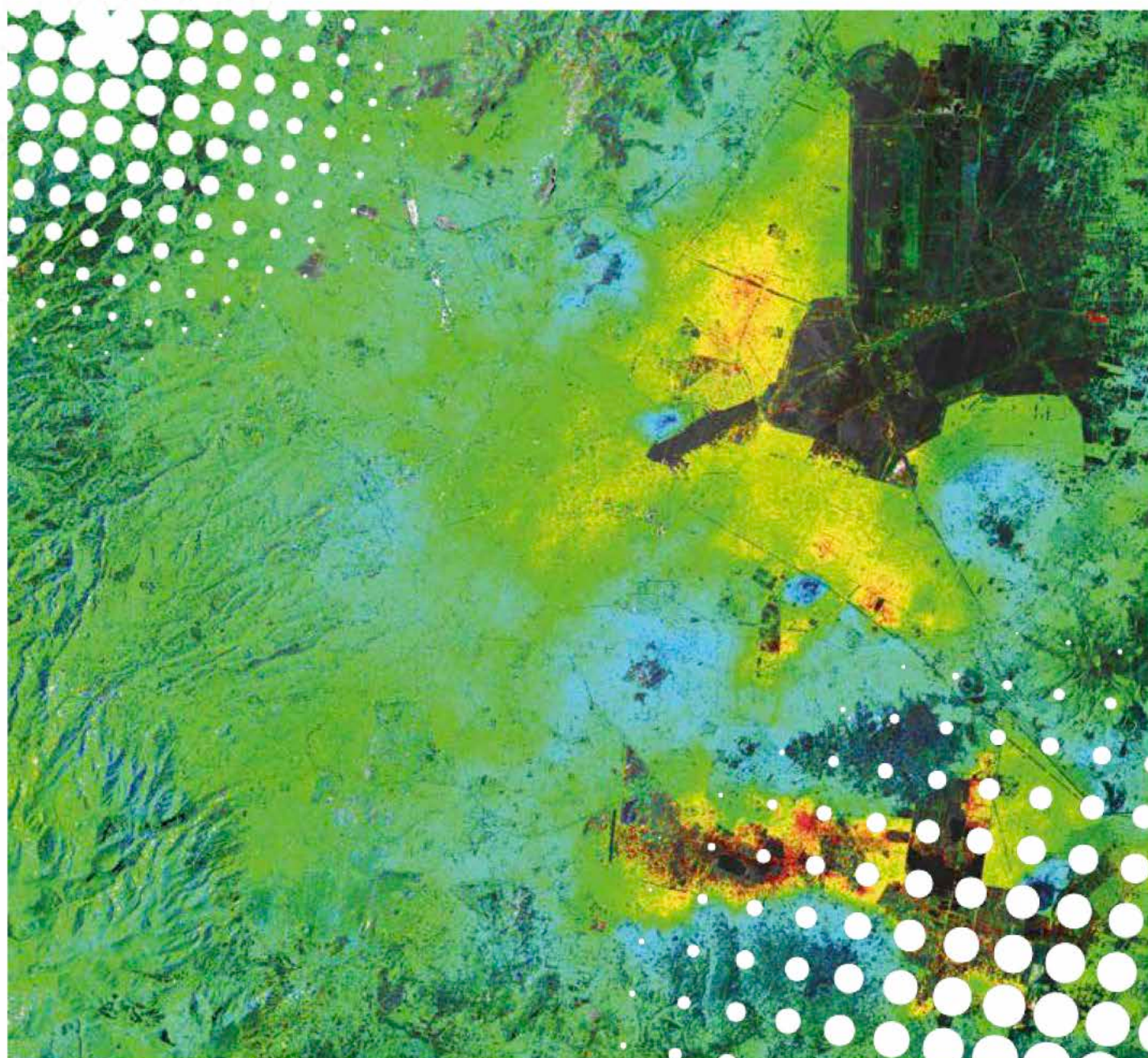




InSAR - Interferometry Department

Accurate and Continuous Ground Movement Monitoring

Contact

MIRE sas

11 rue Camille DESMOULINS
92130 Issy-les-Moulineaux - FRANCE
@ : secretariat@mire-sas.com

www.mire-sas.com

Head of InSAR Department

Matthias JAUVIN

Portable: +33 (0)6 37 26 12 91
@ : matthias.jauvin@mire-sas.com

Combining advanced technologies with proven expertise, we deliver reliable results and a clear understanding of ground movements

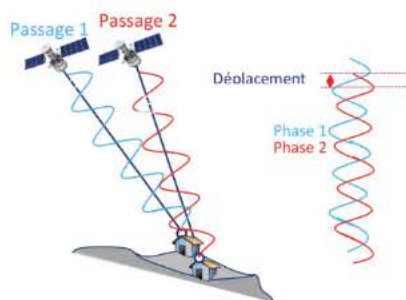
 **≈ 10 000**
measurements per km²

 **30** years
of archives available

Our **multidisciplinary** company stands out through its extensive expertise in the **railway sector and civil engineering structures**.

We provide a comprehensive range of services including surveying, engineering, structural health monitoring, interferometric monitoring (InSAR), 3D laser scanning and BIM, supporting projects from design through to execution.

InSAR Department



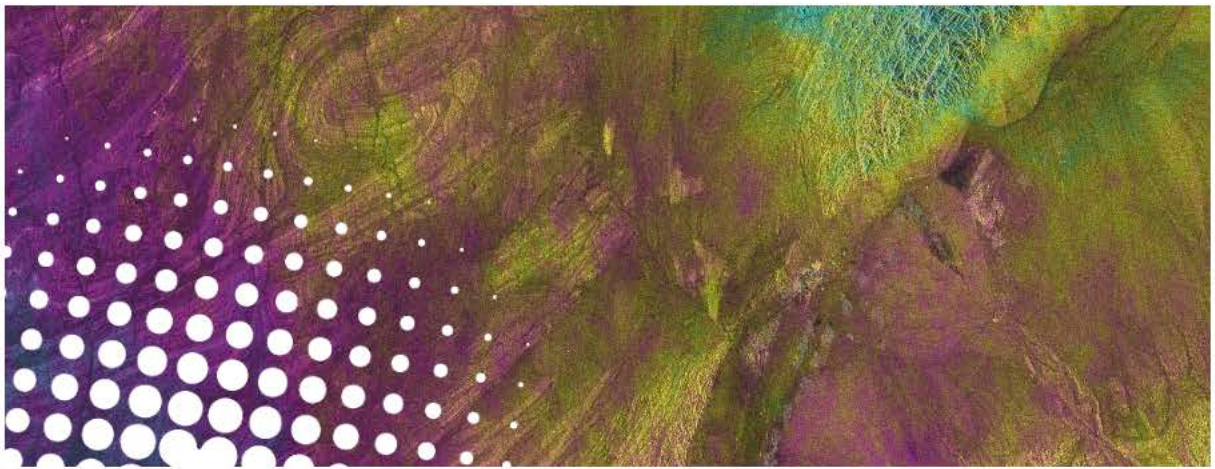
Our InSAR (Interferometric Synthetic Aperture Radar) Department is at the forefront of ground and infrastructure displacement monitoring. InSAR is a remote sensing technology that uses radar imagery to measure ground surface deformation with millimetre-level accuracy. Measurements can be performed both day and night and are not affected by cloud cover.

AN ESSENTIAL COMPLEMENT TO MONITORING SERVICES IN THE RAILWAY AND CONSTRUCTION SECTORS :

As the only technology capable of accurately measuring both historical deformations (up to 30 years in the past) and current movements, InSAR is a valuable complement to topographic monitoring. It supports project owners, engineering consultants, and contractors in addressing the challenges of their infrastructure projects.

The InSAR technique relies on the analysis of multiple radar images acquired at different times. By calculating phase differences between radar signals reflected from the Earth's surface, detailed maps of ground deformation can be generated.

We integrate InSAR technology into our monitoring services, enhancing our ability to observe, analyse and understand infrastructure behaviour with exceptional precision.



RAILWAY AND CONSTRUCTION APPLICATIONS OF INSAR

The railway environment presents unique monitoring challenges due to the complexity and extent of rail networks. Our monitoring solutions incorporate cutting-edge technologies such as Interferometric Synthetic Aperture Radar (InSAR) to detect ground movements and infrastructure deformations with millimetre-level accuracy.



This technology enables regular monitoring of railway infrastructure, ensuring early detection of anomalies and rapid intervention to prevent incidents.

INSAR APPLICATIONS IN THE RAILWAY AND CONSTRUCTION SECTORS

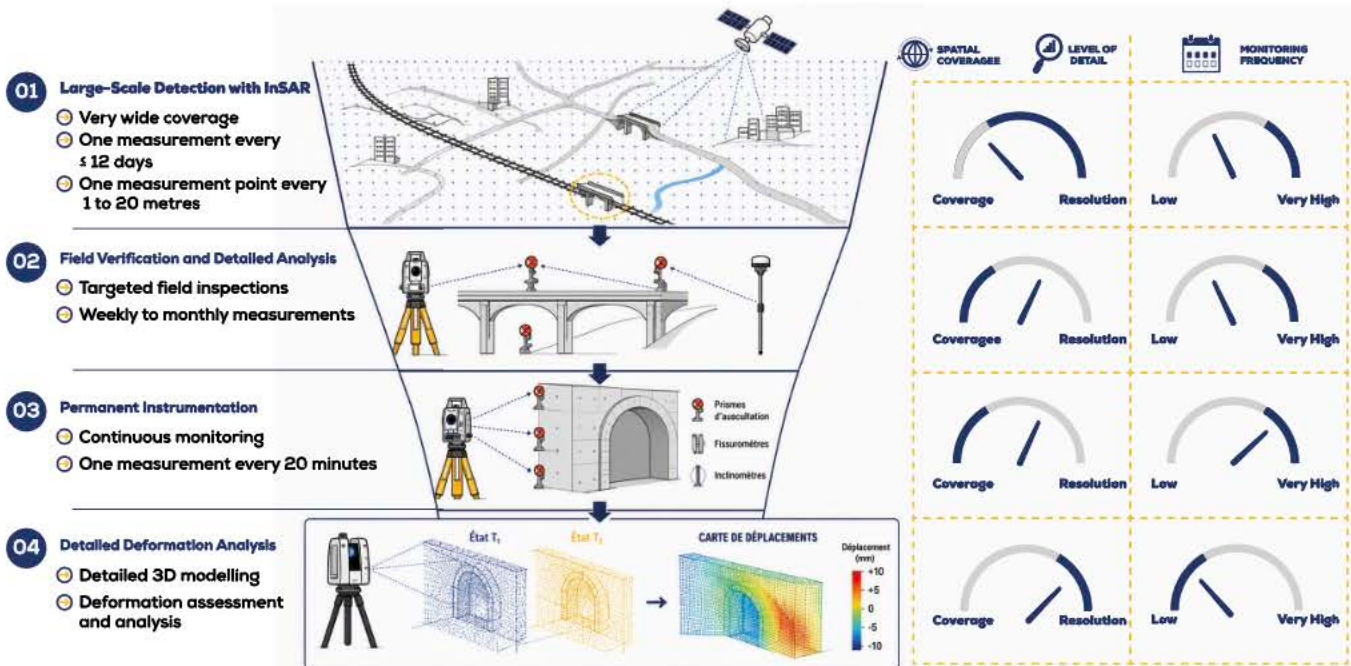
The integration of InSAR into our monitoring services provides numerous benefits for railway infrastructure surveillance :

- **REGULAR AND ACCURATE MONITORING** : InSAR enables continuous and periodic monitoring of infrastructure, detecting even the slightest ground movements and deformations. This regular surveillance is essential for preventing incidents and ensuring the safety of railway networks.
- **EARLY RISK DETECTION** : Thanks to its ability to deliver precise and detailed data, InSAR helps identify potential geotechnical hazards such as landslides and ground subsidence before they become critical.
- **HISTORICAL ANALYSIS** : Satellite archives make it possible to identify ground deformations that occurred many years in the past, in some cases dating back to the early 1990s. Archive availability may vary and is subject to a feasibility assessment.
- **EXTENSIVE COVERAGE** : Unlike traditional monitoring methods, InSAR can cover large areas without requiring on-site equipment installation. This allows efficient monitoring of long railway corridors and areas that are difficult to access.
- **COMPLEMENTARY TO TRADITIONAL MONITORING TECHNIQUES** : InSAR complements conventional monitoring methods, such as topographic surveys and geotechnical investigations, by providing a comprehensive overview of ground movements across large areas.



INFRASTRUCTURE MONITORING STRATEGY

Funnel Approach



We offer a comprehensive of services is available, including surveying, monitoring and instrumentation, railway engineering studies, and 3D modelling.

Using InSAR technology, we monitor movements affecting railway infrastructure, embankments, and surrounding areas to detect instabilities at an early stage, enhancing both safety and maintenance efficiency.

SELECTED PROJECT REFERENCES

- **CHUSOGPN** (Saint-Ouen) : Management of geotechnical risks through the monitoring of adjacent structures in a dense urban environment.
- **REKO DIQ** (Pakistan) : Large-scale historical analysis of an operational railway corridor extending over 1,000 km.
- **TELT** (CO5a Section) : Retrospective analysis of 20 years of ground evolution (2004-2020) using a multi-resolution approach.
- **RER E Extension** (HSL Station) : Monitoring groundwater drawdown during the construction of the western tunnel portal.

Find us accross our network of locations

Head Office

ZI rue Eugène Freyssinet
77500 Chelles - FRANCE

Pierre GARDEUX

Portable : (+33) 06 02 16 02 26

@ : pgardeux@mire-sas.com

Paris Office

Bâtiment URBAN GARDEN
11 rue Camille Desmoulins
92130 Issy-Les-Moulineaux - FRANCE

Stéphane GACHON

Portable: (+33) 06 07 89 90 64

@ : stephane.gachon@mire-sas.com

Southern Office

NGE - Direction régionale Midi-Pyrénées
4 rue Eric Tabarly - 31600 Muret - FRANCE

Romain TEODOMANTE

Portable: (+33) 07 61 84 22 55

@ : romain.teodomante@mire-sas.com