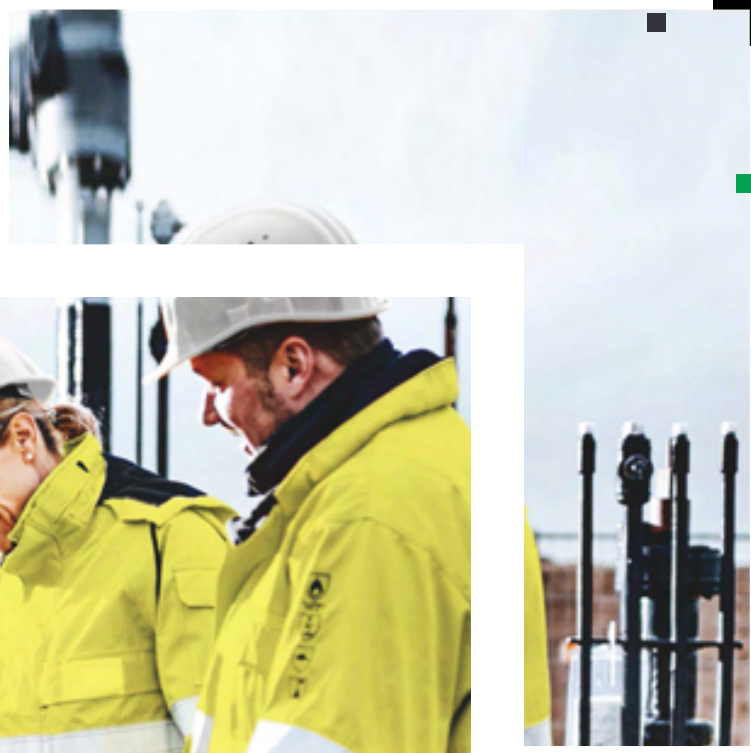
LiveEO ONTRAS

The case of Ontras

How Ground Deformation Monitoring Facilitated Ontras's Rerouting Decision



Introduction

Ground movements are changes in the surface of the earth caused by natural phenomena (seismic events, landslides, etc) and/or human activities (construction, mining, etc). While big ground movements have been known to cause disastrous events in the past, what is lesser-known and often overlooked are the smaller, lurking movements that too can be potentially catastrophic. These small changes can cause dangerous accidents and damage assets worth millions of dollars every year, making their timely detection and prevention extremely important

The Challenge at Ontras

Lack of actionable data leads to the inability of decision-making

Ontras is a gas transmission company that operates 7,700 kilometers of pipeline network in eastern Germany. As a company that is heavily reliant on underground infrastructure, stress caused by ground movements in specific regions was a major threat to the operations, with proximity to a former mining site compounding the danger. Management was well aware of the situation, and were further concerned by the importance of the pipelines for regional and international supply.

Ontras hired a service provider to gauge the extent of the problem using conventional measuring methods such as leveling. Weekly data were gathered to serve this purpose. However, the raw data from these observations were insufficient to adequately justify a decision to relocate the pipelines. Despite being aware of the presence of risky ground near the asset, Ontras sought for visual evidence to solidify the decision to relocate the pipeline in the coming years.

Ontras's management wanted more actionable observations on ground movements, including long-term trends on a large area.

Solution: LiveEO's Ground Deformation Monitoring

The team at LiveEO understood the problem faced by Ontras and set out to find a solution. The objective was to gather data to figure out the intensity of the problem and find a timely solution. The following was done to achieve this purpose:

Historical data gathered

LiveEO's analysis identified long-term trends based on historical data since 2017. This created a robust data source for a more effective study of the ground movements.

Satellite imagery to ensure millimeter accuracy

Satellite-based analysis enabled detailed monitoring of subsidence that might have occurred over a long period of time and was invisible to the human eye.

Visualized results

The continuous monitoring of big data collected from these long-term trends facilitated the maintenance of accurate records and provided visualizations necessary to take action.

Technology

Data recorded over time by satellites equipped with Synthetic Aperture Radar (SAR) sensors was used to detect minute ground movements in the area of interest. Horizontal and vertical displacement were calculated with new data points being added every six days to create a constant time series. Both ascending and descending orbital paths were evaluated, where each data point was compared with a large number of previous and subsequent recordings. More than 2000 interferograms each were used to examine the ascending and descending orbital paths.

The results of the comparisons were then assigned to one deformation at a time using an inversion method that takes into account the data quality of the interferograms. Hereafter, horizontal and vertical deformation components were separated to generate the results.

LiveEO

Results

Actionable data improves decision-making

Both - horizontal and vertical displacements - were observed in the area of interest.

The final solution was provided in the LiveEO web application. The blue lines represent the pipeline areas while the red areas depict the areas with ground movements. Significant displacement was recorded over the period 2019-21, with some areas having subsidence of more than 30 cmt, giving Ontras confidence in their decision regarding the relocation of asset.

Vertical subsidence

The vertical movement (as an excerpt from the LiveEO app) is shown below (Figure 1).

The red areas depict subsidence of 30+ cm. .

Figure 1: Ground Deformation Analysis - Vertical Movement

Horizontal subsidence

The horizontal movement (as an excerpt from the LiveEO app) is shown below (Figure 2). The red areas depict subsidence of 12+ cm.

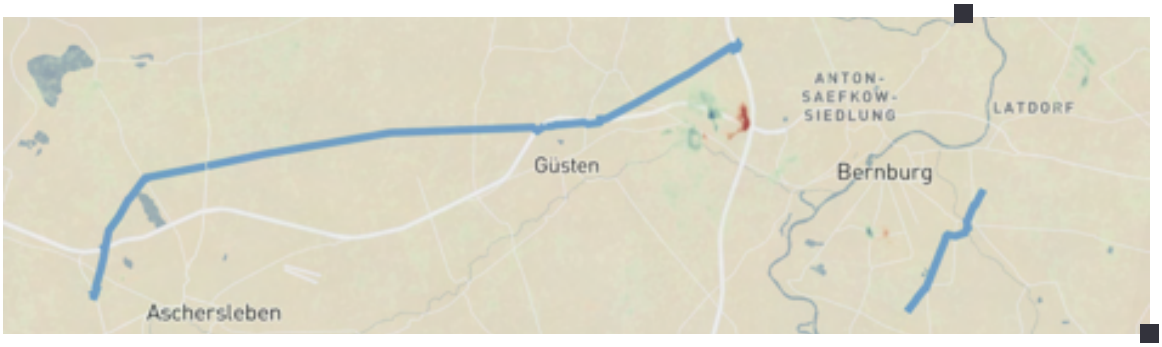


Figure 2: Ground Deformation Analysis - Horizontal Movement

Impact

Quick decision-making and saving of costs

The analysis revealed long-term trends and made them visually accessible to the stakeholders. As a result, Ontras was confident about their informed decisions to relocate their infrastructure.

	Before using LiveEO	After using LiveEO
Data	Raw data, not easily consumable.	Efficient data gathered and translated into visual insights for long-term trends.
Communication and decision-making	Indecisiveness around the relocation of the pipeline network due to ineffective commu-nication to the management.	Data-driven justification of decision facilitated by high-end technology and accurate methods of measurement.
Cost reduction	Cost-Intensive in-situ monitoring with additional procedural cost to analyze the data.	Cost-efficient satellite monitoring including historical data, easily digestible for non-experts.
Future course of action	No insights on upcoming pipeline projects.	Identification of long-term trends to provide better insights on future projects and planning of new routes for upcoming pipeline networks.

Conclusion

The objective of this exercise was to investigate the subsidence in the pipeline area of Ontras. Based on the study, the following conclusions can be drawn:

01

Minute ground displacements are not visible to the human eye but can potentially lead to disasters that put infrastructure and human life at risk.

02

To mitigate such risk, it is important to monitor ground movements and use such observations to make decisions regarding where infrastructure should be placed.

03

Such data-driven decision-making enables predictive maintenance of firms' existing as well as upcoming infrastructure and assets.

The LiveEO ground deformation monitoring has helped multiple such firms to detect dangers and alleviate the risk of damage. Our proprietary risk models combined with data-driven machine learning algorithms have helped numerous firms ascertain the information necessary to make decisions regarding their infrastructure projects. This has helped save thousands of dollars and enabled efficient infrastructure functioning.