

# The Permanent Three-Dimensional Data Acquisition of Geotechnical Structures Using Web-Based Application of Terrestrial LIDAR - Chances and Risks from an Engineering Geodetic Point of View

Daniel Schröder (Germany)

**Key words:** Deformation measurement; Engineering survey; Geoinformation/GI; Laser scanning; Mine surveying; Remote sensing; Risk management; Standards; LIDAR; Permanent Laser Scanning; Multi-temporal 3D Point Cloud Analysis; Web-based Monitoring; Georeferencing; Error Budget; Level of Detection

## SUMMARY

As part of the research project i<sup>2</sup>MON - "Integrated Impact MONitoring for the detection of ground and surface displacements caused by coal mining" funded by HORIZON 2020 through the RFCS (Research Fund for Coal and Steel), the leading author, in collaboration with various European institutions, is working on the development of an integrated monitoring service for the identification and assessment of ground and slope movements associated with coal mining. The focus is on the correct integration (reliability, accuracy and integrity) of a long range laser scanner into a continuous web-based monitoring system from an engineering geodetic point of view.

The objective of this work is the development of an integrated monitoring service for the identification and evaluation of ground and slope movements in the context of coal mining, the prevention of natural hazards and protection of infrastructure. The focus is on the integration of a long- range laser scanner (1) into a continuous web-based monitoring system and (2) from an engineering geodetic point of view.

In the Vals Valley in Tyrol, a permanently installed RIEGL laser scanner was successfully operated web-based in the area of a rockfall in the summer of 2020 and 2021. The data was visualized in near real-time on a monitoring platform. This paper will describe the practical benefits of this installation. In addition to the potentials of automatic data acquisition, possibilities for multi-temporal analysis with regard to spatio-temporal changes will be discussed.

The authors identify and discuss time-varying artefacts within the data based on different methods of georeferencing and the atmosphere as a restrictive influence on terrestrial long-range laser scanning.

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