



Notification: 'InSar subsidence data for salt cavern management in Twente' (KEM-49)

Organization: Ministry of Climate Policy and Green Growth (KGG)

Reference: KEM-49 / 202406185

Purpose of the notification

The purpose of this notification is to determine whether there are parties interested to perform the research as described below.

Background information

Salt solution mining in the Haaksbergen/Enschede/Hengelo has continued for more than 60 years. The salt layer being exploited is relatively shallow (400-500 meter). Various mining strategies have been deployed, always resulting in some subsidence, and one sinkhole incident. Currently applied mining methods are designed to also minimize subsidence risks. A regular subsidence monitoring strategy is in place using geodetic surveying every 1 to 5 years. There are 61 caverns in Twente which are or might become unstable ([Zoutwinning in Twente | Zoutwinning | Staatstoezicht op de Mijnen \(sodm.nl\)](#)).

To monitor the caverns the micro seismic network was installed in 2016 as well as obligatory periodic sonar measurements of the caverns. Additionally, a lot of the potential unstable caverns are being filled with slurry to prevent instability. In 2022 an investigation revealed that one cavern had become unstable and has migrated to the surface (underneath the Twente terrain). Independent InSAR measurements of subsidence rates would possibly give more insight into which caverns are unstable and need filling.

InSAR is a relatively new satellite-based measurement method that is capable of monitoring ground motions in the area at much shorter time intervals, allowing for early detection of irregular subsidence behavior. On the other hand, the measurement locations are not easily defined, and quality control of interpreted subsidence data is not fully robust. The method has potential, but so far has not been applied to this area, particularly focusing on salt mine subsidence and stability.

Objective

The KEM program is interested to understand if surface changes observed by data from InSAR satellites can be used to track changes in cavern deformations in the subsurface. These changes have a direct influence of the integrity and quality of the caverns, which may be used for gas, CO₂ or hydrogen storage. On top of that, improved understanding of the cavern deformation's influence on the surface can be used for potential damage assessment directly and in the future.

Research questions

The research questions to be addressed are:

- (I) What are the quality control procedures of the InSAR data and what accuracy and precision can be expected?
- (II) What are the worldwide experiences with salt cavern monitoring using InSAR?
- (III) Which locations over the last 10 years show subsidence rates which correspond to possible unstable salt caverns?
- (IV) What is the coupling between (known) cavern deformation and subsidence data? Which caverns may be unstable?

Based on answers to these research questions, recommendations should be given on how InSAR data can be of added value to subsidence monitoring (including early warning for instability of the caverns) and model calibration.

Deliverables expected

A final report and with underlying data and recommendations.

Timeline

Intended start of project is December 2024 with a duration of 1 year.

Budget

The maximum budget for this research is **€100.000,-** (one hundred thousand euros) excluding VAT.

Required skills / experience / capacity

InSAR data processing and interpretation, and Salt cavern dynamics.

Application

Interested companies / consultants are invited to respond to the Procurement Office of the Ministry of Economic Affairs.

The deadline for responding to this notification is set at the **20st of September 2024, 12.00 a.m. CEST.**