

October 2025

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New visiting researcher joining to work on WP2: Orkun Türe

I'm Orkun Türe from Turkey. I'm thrilled to be a Visiting Researcher at "Norwegian Geotechnical Institute (NGI)" and "Norwegian University of Science and Technology (NTNU)". I will be working on the SAFERCLAY project to ensure safer and more resilient urban development in quick clay areas.

Just as NGI's motto says: to keep society "on safe ground".



Because natural hazards can have devastating consequences, I have always been deeply interested in understanding and mitigating their impacts. This motivation led me to combine the field of natural hazards with engineering with the aim of developing practical, science-based solutions to geotechnical problems in hazard-prone regions. I pursued this interdisciplinary focus through my Ph.D. studies in Geotechnical Engineering and Applied Geology at Muğla Sıtkı Koçman University, Turkey. Given that Turkey lies within one of the most tectonically active regions in the world and is highly susceptible to soil liquefaction, my research was designed as a problem-driven study focused on evaluating the liquefaction potential of Quaternary deposits. By integrating geotechnical analysis with machine learning techniques, my goal was not only to advance scientific understanding, but also to address a critical real-world challenge affecting the safety and resilience of the built environment in seismic regions; and to contribute meaningfully to the academic literature.

Quick clay is a geohazard specific to Scandinavian countries, Canada, and North America. As a researcher from a different geographical setting, I was highly motivated to deepen my understanding of this unique phenomenon. By combining my background in geotechnical engineering and my interest in data science, ***I saw an opportunity to integrate machine learning techniques into the study of quick clay behavior.*** My goal is not only to contribute to this specialized field, but also to transfer the

knowledge and experience I gain here to other geotechnical challenges in different environments, especially those relevant to my home country.

That's why I feel truly honoured to be a Visiting Researcher contributing to the SAFERCLAY project, working on quick clay under the guidance of Emir Ahmet Oğuz (Leader of Work Package 2). I will be ***working on the identification of quick clay zones and mitigation of quick clay landslides by integrating geological, climatic and anthropogenic landslide causative parameters from satellite and field data with machine learning models.*** This enables dynamic updates to slope stability analyses, helping decision-makers, industries, and communities balance safety and sustainability in quick clay regions. Looking forward to contributing more to the SAFERCLAY project!

From SAFERCLAY team we say: WELCOME Orkun!

Five NTNU master's students contributing to WP1

Five NTNU master's students will conduct their thesis research closely related to SAFERCLAY WP1.

- Eirik Sjøgren Amundsen and Christoffer Nordang Larsen are supervised by Associate Professor Yutao Pan (NTNU) and Dr. Jean-Sébastien L'Heureux (NGI).
- Jørgen Groven, Johan Bergfjord Filseth, and Ole Martin Bjelland are supervised by Associate Professor Ivan Depina (NTNU).

Below are their self-introductions and summaries of their ongoing thesis research:

Master's Thesis: Comparative Slope Stability Analysis Based on Pore Pressure Estimation Using SEEP/W and GeoSuite with Kriging Techniques

We are ***Eirik Sjøgren Amundsen (left)*** and ***Christoffer Nordang Larsen (right)***, currently in our final year at NTNU. Together, we are conducting a master's thesis that ***investigates slope stability with a focus on pore pressure estimation methods.***

The study ***compares deterministic and statistical approaches*** and ***evaluates their influence on slope stability assessments*** using software tools such as GeoSuite, SEEP/W, and SLOPE/W.

Our research is driven by the growing challenges associated with climate change, including heavier rainfall and more frequent extreme weather events. By improving the estimation of pore pressures, we aim to enhance the reliability of slope stability analyses. Ultimately, this knowledge can support proactive measures to protect critical infrastructure and, most importantly, reduce the risk of loss of life.



Master's Thesis: Mapping and Management of Erosion and Quick Clay Landslides in Norway – and How the Methodology Can Be Further Developed and Improved

Our names are **Jørgen Groven (left)** and **Johan Bergffjord Filseth (right)**. We are currently in our fifth and final year of the Civil and Environmental Engineering program at NTNU Trondheim, specializing in Geotechnical Engineering. We are working on a specialization project and master's thesis focusing on **Mapping and Management of Erosion and Quick Clay Landslides in Norway – and How the Methodology Can Be Further Developed and Improved**. Through our work, we hope to contribute new perspectives on the current mapping and assessment methods and inspire further development toward more robust and effective solutions.

We find the SAFERCLAY project particularly interesting because there is a great national need to strengthen our understanding and mitigation of quick clay hazards. This makes our contribution to the project both meaningful and essential for improving safety and future practices.



Master's Thesis: Erosion effects on the stability of quick clay slopes

My name is **Ole Martin Bjelland**, and I'm a master's student in Civil and Environmental Engineering at NTNU. My thesis focuses on the **erosion effects on the stability of quick clay slopes**. Erosion is recognized as one of the key natural triggers of quick clay landslides, as it gradually removes support at the slope toe and can initiate progressive failure.

In my work, I combine a literature review with preliminary numerical analyses using advanced soil models, most likely the **S-CLAY1S model**, to better understand how changes at the slope toe influence stability.

Through SaferClay, I hope to contribute to a better understanding of erosion processes and their role in slope failure mechanisms. I'm particularly motivated by the potential to improve predictive modelling tools and mitigation strategies for erosion-driven landslides, a topic that has become even more relevant in light of recent events like the Gjerdrum slide.

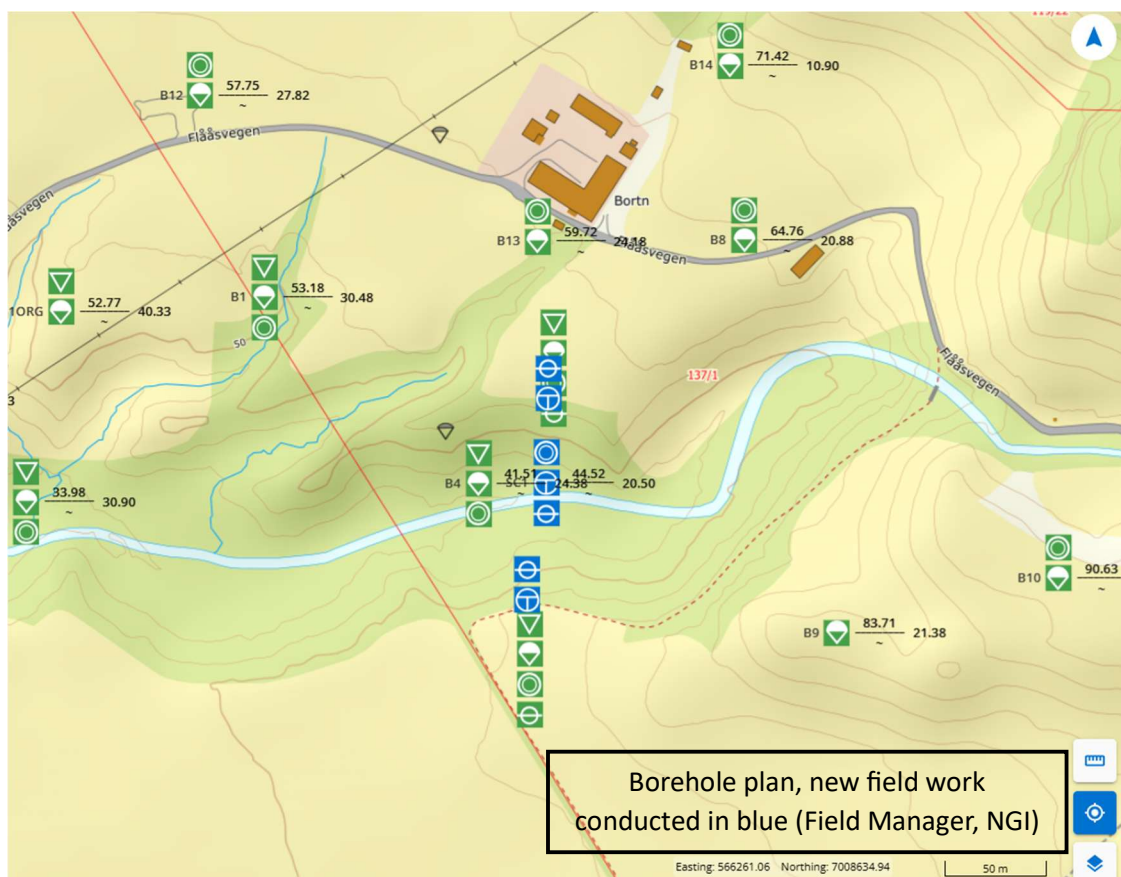


WP1: Fieldwork and instrumentation update

For the monitoring of hydrogeological conditions under Task T1.4 (WP1), two case study areas have been selected: Bortna in Melhus Municipality and Jeksla in Lillestrøm Municipality. Both sites are located in ravine terrain with quick clay and have existing data from previous field investigations. Some erosion activity has been observed along the rivers; however, as there are no current plans for erosion protection measures, these sites are well suited for the planned case studies. At each site, three locations have been established for pore pressure monitoring, with sensors installed at three different depths. The measurements will be continuously collected using the remote monitoring system NGI Live.

Bortna, Melhus

Multiconsult team, led by Frank Stæhli, conducted the field investigations and instrumentation at Bortna during Week 42. Due to adverse weather conditions, the team faced several challenges in the field. Storm Amy had felled trees that blocked access routes, and the slippery ground made transporting the drilling rig up and down the slopes a risky operation. For safety reasons, one pore pressure measurement location was relocated from the bottom of the slope near the river to the southern side of Bortna, at the top of the slope. During the fieldwork, NTNU representatives (Ivan Depina and master's students) and NGI representative (Rui Tao) visited the site and collected additional crust material samples for further analysis.





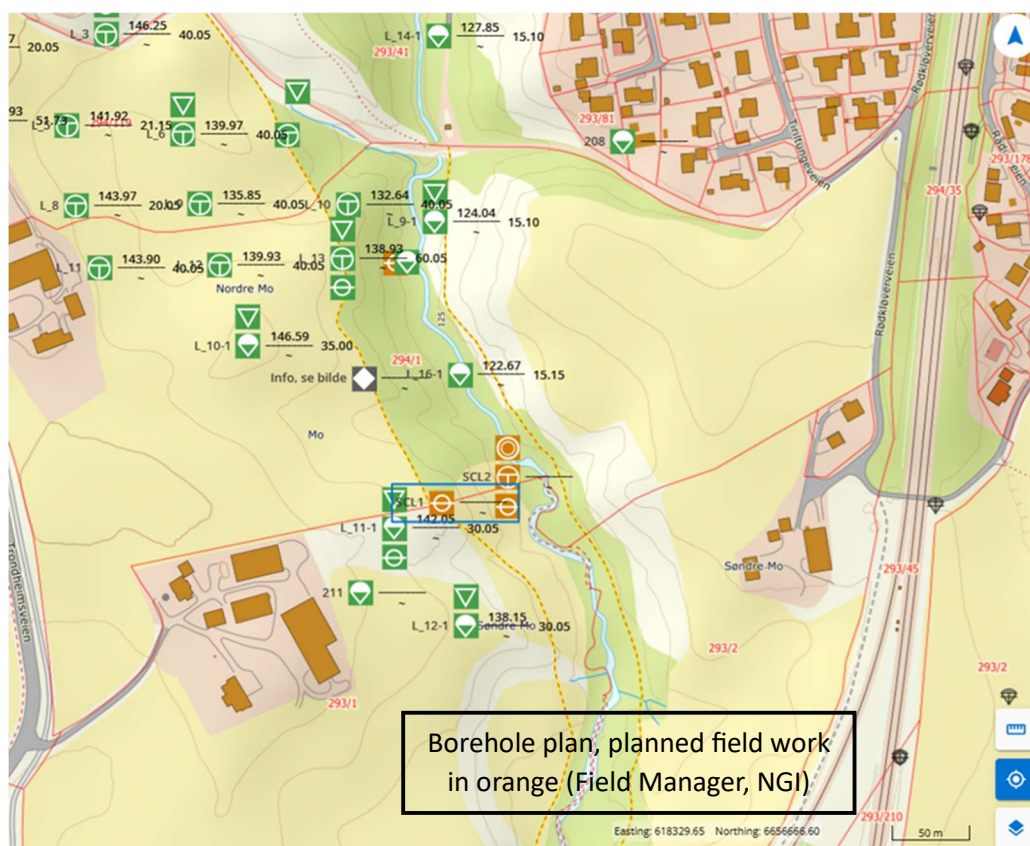
Piezometer pipes (photo: Rui Tao, NGI)



Multiconsult drilling rig (photo: Rui Tao, NGI)

Jeksla, Lillestrøm

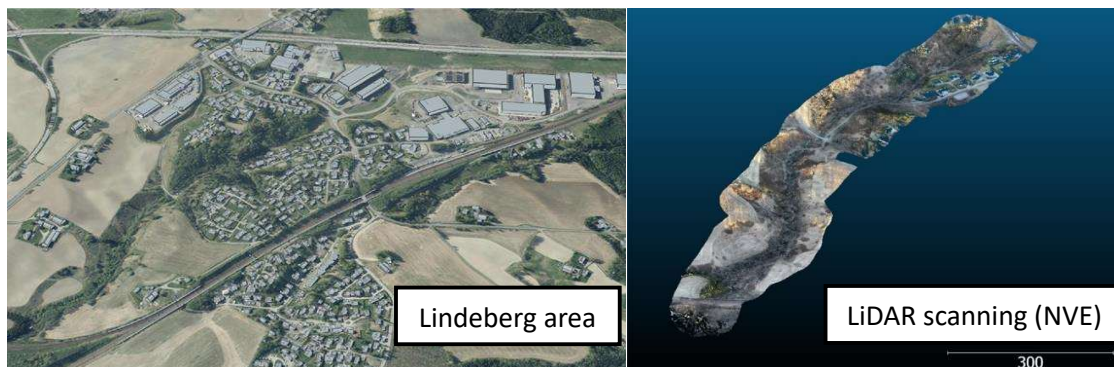
NGI plans to conduct field investigations at the Jeksla case site in Lillestrøm in Week 46. In Week 43 NGI and Lillestrøm municipality visited the field in advance of the instrumentation, together with the landowner.



WP2: UAV LiDAR workflow testing and planned scanning in the Lindeberg area

As one of the outcomes of the NGI SP15 project, a UAV LiDAR workflow has been developed based on the model-to-model cloud comparison (M3C2) method. NGI tested the workflow in the Lindeberg area using LiDAR data provided by NVE in 2024, demonstrating that the detected erosion patterns closely matched field observations.

For this year, scanning is planned for mid-November, covering the same region. This timing is chosen to ensure reduced vegetation and lower stream water levels, which are expected to improve data quality and detection accuracy. Additionally, a preliminary literature review on the various methods available for erosion detection is currently ongoing.



WP3 Strengthening our research on impact of quick clay landslides and its mitigation measures

We are pleased to announce a new collaboration with three master's students from the Institute of Geography at NTNU. They will contribute to our ongoing work on the cultural and environmental impact of quick clay landslides and their mitigation measures, providing valuable insights to Work Package 3 (WP3) and enhancing our knowledge base.

In addition, we have expanded our scope with a second case study: Dølibekken. This site has been monitored during 2025 for the impact of erosion safety measures, and now under Saferclay project, the monitoring program will continue through 2025 and, hopefully, into 2026. The data collected will allow us to compare results with the Skjeldstadmark case, improving our understanding of impact of mitigation measures.

Dølibekken is highly relevant to Saferclay's objectives, as it addresses many of the same challenges. Our ultimate goal is to integrate these findings into a decision-making framework that supports end-users in evaluating mitigation measures, helping to build safer and more resilient communities.



Dølibekken after erosion securing. July 2025. Foto: Kjetil Ask



Dølibekken after erosion securing. July 2025. Foto: Sigrid Arnestad

WP4 Ongoing investigation of slope safety factor standards across various countries

The ongoing work focuses on a comparative investigation of slope safety factor (FoS) standards applied in different countries. The FoS defines how stable a slope must be under various loading and environmental conditions before it is considered acceptable for design or risk assessment. However, these standards vary considerably between nations due to differences in geological conditions, engineering practices, climate, and risk tolerance. By comparing national approaches, this investigation seeks to identify best practices and understand how different safety margins reflect each country's balance between safety, cost, and reliability.

The outcomes of this study may provide valuable guidance for the Norwegian standard on quick clay slopes. While the current Norwegian practice is considered conservative, enhancing public safety and reducing the likelihood of slope failure, it can also result in higher construction and maintenance costs due to stringent design requirements and larger safety buffers. The investigation aims to evaluate whether this conservatism is justified by the unique characteristics of Norwegian quick clay or if there is room for optimization without compromising safety.

Annual workshop in Trondheim, December 2025



ANNUAL SAFERCLAY WORKSHOP IN TRONDHEIM

We are excited to invite all project participants to the **Annual SAFERCLAY Workshop**, which will take place in **Trondheim on Wednesday, December 3rd 2025**

We are hoping for broad participation across the project team, as this workshop will be a valuable opportunity to strengthen collaboration and foster learning across work packages. By coming together, we aim to share insights, align on progress, and pave the way for even more effective cooperation in the year ahead.

SAFERCLAY Annual Seminar - Program overview

Time	Tittel	WP
08:30-09:00	Arrival and coffee	
09:00-09:10	Velkommen og introduksjon	
09:10-09:30	Preliminary results looking into the potential impact of climate changes on the hydrogeology of clay slopes - Case studie I Melhus og Lillestrøm (WP1)	WP1
09:30-09:50	The impact of past and future climate change, urbanization, land-use change and human activity on erosion (WP1)	
09:50-10:20	Improved hazard mapping with remote sensing technology: terrain changes using Lidar and INSAR - Status	WP2
10:20-10:30	Presentation of MSc students in SAFERCLAY	
10:30-10:45	Pause og mingling	
10:45-11:15	Monitoring impact of mitigation measures, the case studies of Skjelstadmarka & Dølibekken and how this contribute to a decision-making framework	WP3
11:15-11:45	Levanger + kort om planer for WP4 (fokus på spørreundersøkelsen)	WP4
11:45-12:15	Panel discussion - Are we on the right track?	
....		
12:15-13:00	Lunch	
13:00-15:00	Steering Committee meeting	
13:00-15:00	WP meetings (if wanted)	