

Master's projects on karst, caves and water-related topics

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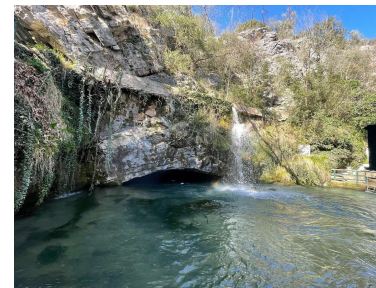
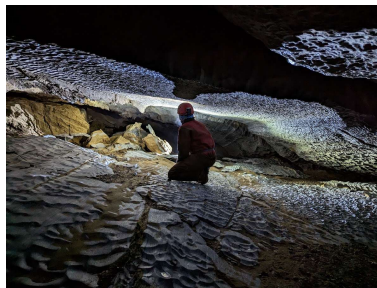


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Associated professor in physical geography

Research interests:

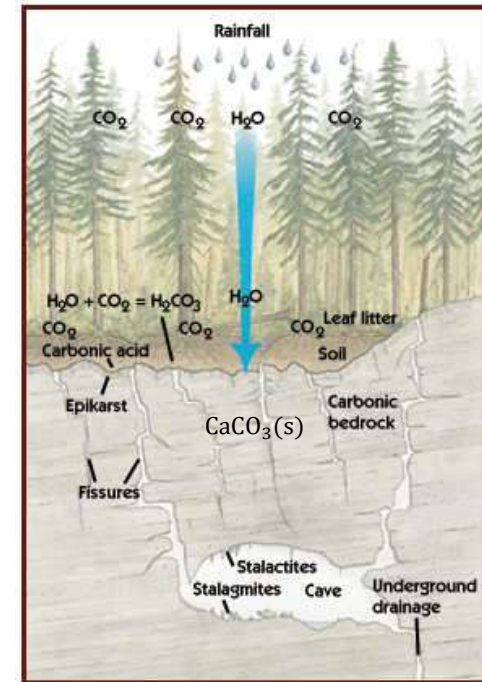
- Caves, speleology and landscape development
 - Karst caves and coastal caves
- Groundwater and karst hydrology
 - Hydrodynamic function of underground systems, water supply and contamination issues
- Water-related geohazards like flooding, slope instability, subsidence and sinkhole collapse
- Reconstruction of the deglaciation history, ice-dammed lakes and canyon development
- How climate and environmental changes and human activity influence hydrological systems



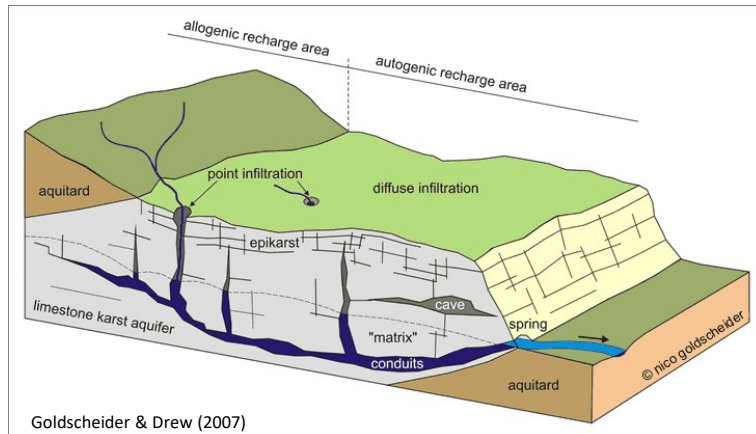
What is karst?

- Landscape formed by dissolution of soluble bedrock, such as limestone, dolomite and marble
- Characterized by rugged surface (karren and grikes), enclosed depressions (dolines) and subsurface drainage (caves)

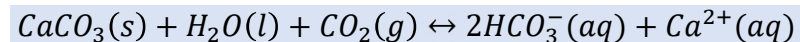
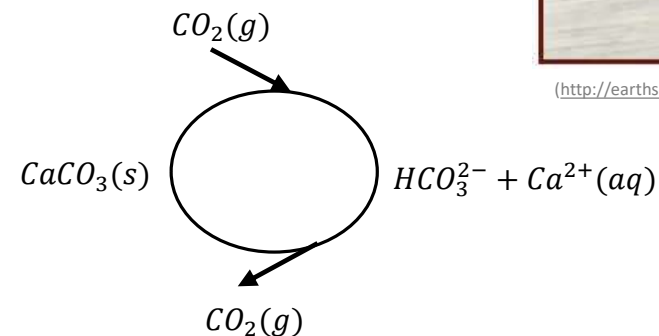
Dissolution of calcite



(<http://earthsci.org/processes/geopro/karst/karst.htm>)



Goldscheider & Drew (2007)

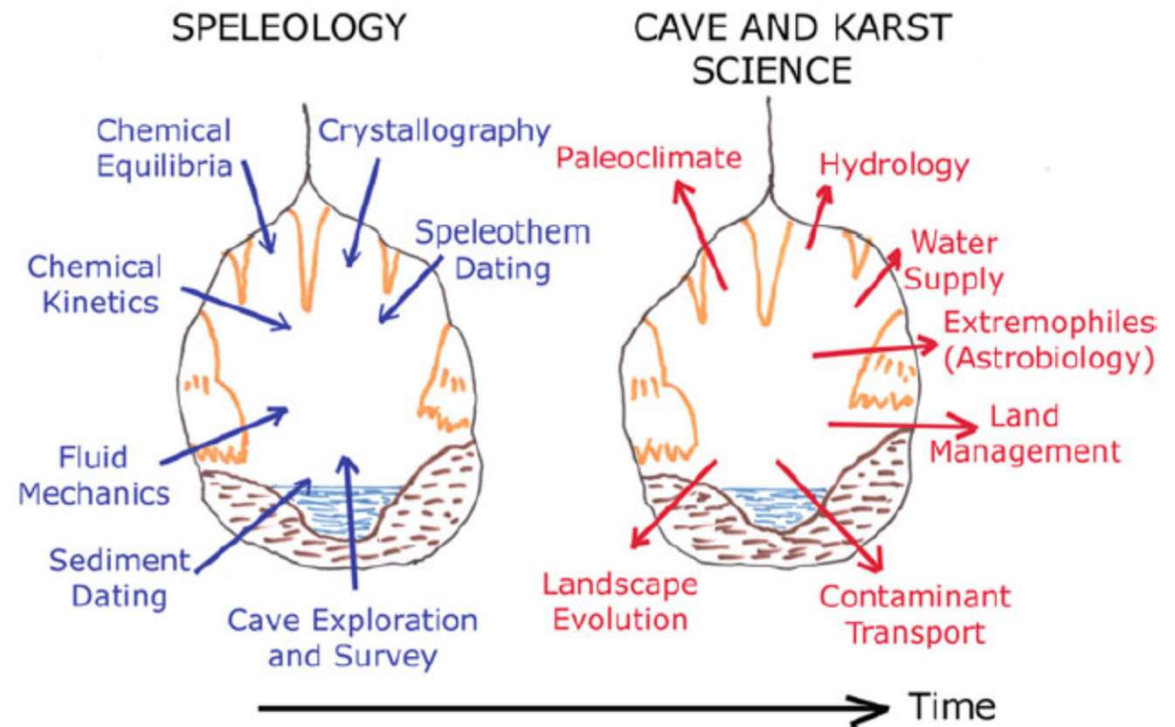


What is the role of karst caves in science?

Caves are natural archives of knowledge about how climate, fauna, flora, glaciers and landscapes have evolved over the past million years.



Speleology: the scientific study that is concerned with all aspects of caves and cave systems (Norw.: huleforskning)



Sketch showing some of the external inputs to the development of cave science and the outputs that cave and karst science have contributed to science in large

From White in the introduction to "Hydrogeological and Environmental Investigations in Karst Systems" by Andreo et al. (2015)

Karst and cave-related projects

Background

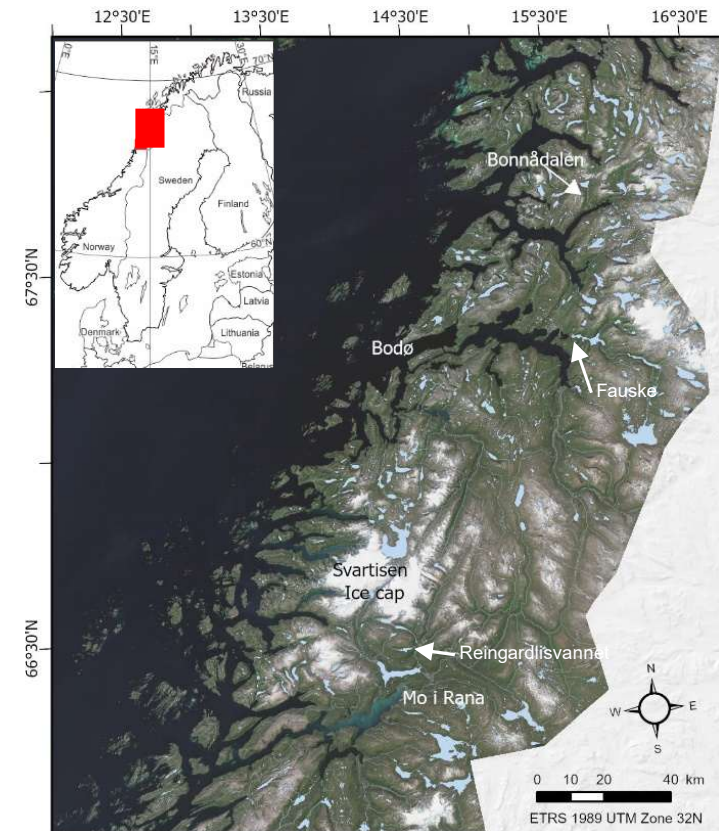
Karst caves are formed through the dissolution, and morphological features developed under former drainage conditions and hydrological regimes are often preserved in the cave walls. Cave deposits include clastic sediments, speleothems, remnants of animals and plants, unique microbial communities and pristine surfaces that represent increasingly rare natural archives. The stable environment, largely protected from external influences, makes caves valuable repositories of geological, biological and paleoclimatic history. At the same time, this stability makes cave ecosystems highly vulnerable to disturbance, as even a single footprint may remain visible for thousands of years.

Expanding infrastructure developments, including wind farms and road construction, may affect previously undisturbed karst landscapes and may facilitate public access to vulnerable cave systems. Furthermore, growing interest in adventure tourism and outdoor recreation, combined with increased exposure through social media and reality television programs, has led to increased visitor pressure in cave and karst environments.

Possible research topics

- Cave development (speleogenesis) and landscape evolution
- Karst hydrology

Field areas: Nordland County, in Sørfold, Fauske or Rana municipality, depending on the number of students and their interests.



Karst and cave-related projects

Possible research topics

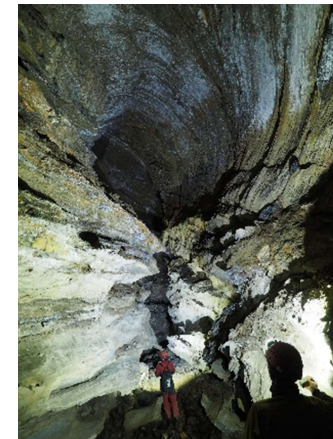
Projects may focus on one or more aspects of cave development and karst hydrology

- Reconstruction of cave development and landscape evolution based on cave survey and documentation of cave morphology and sedimentary records. Emphasis may be placed on identifying former hydrological conditions, assessing effects of glaciation and relating cave development to regional landscape evolution.
- Hydrological investigations of active karst systems to characterize groundwater flow paths, aquifer geometry and storage capacity, residence time and system response to hydrological forcing. The project may also address water quality and groundwater vulnerability.

Methods may include cave surveying, documentation of morphological features, scallops analysis, sedimentological investigations, U-series and radiocarbon dating, hydrological tracing experiments, discharge measurements, monitoring of hydrological and meteorological parameters, water sampling and geochemical analyses, time series analysis, GIS-based mapping and groundwater vulnerability assessment.

The projects offer the opportunities for collaboration several students on complementary aspects of cave development, karst hydrology and landscape evolution.

Fieldwork in caves can be physically demanding and is conducted in a cold, dark and often wet environment. For safety reasons, all cave work must be carried out by a minimum of two persons. At the same time, caves are fascinating and aesthetically striking natural environments, offering a rare opportunity to explore hidden underground landscapes and observe geological features and processes that remain inaccessible to most people.



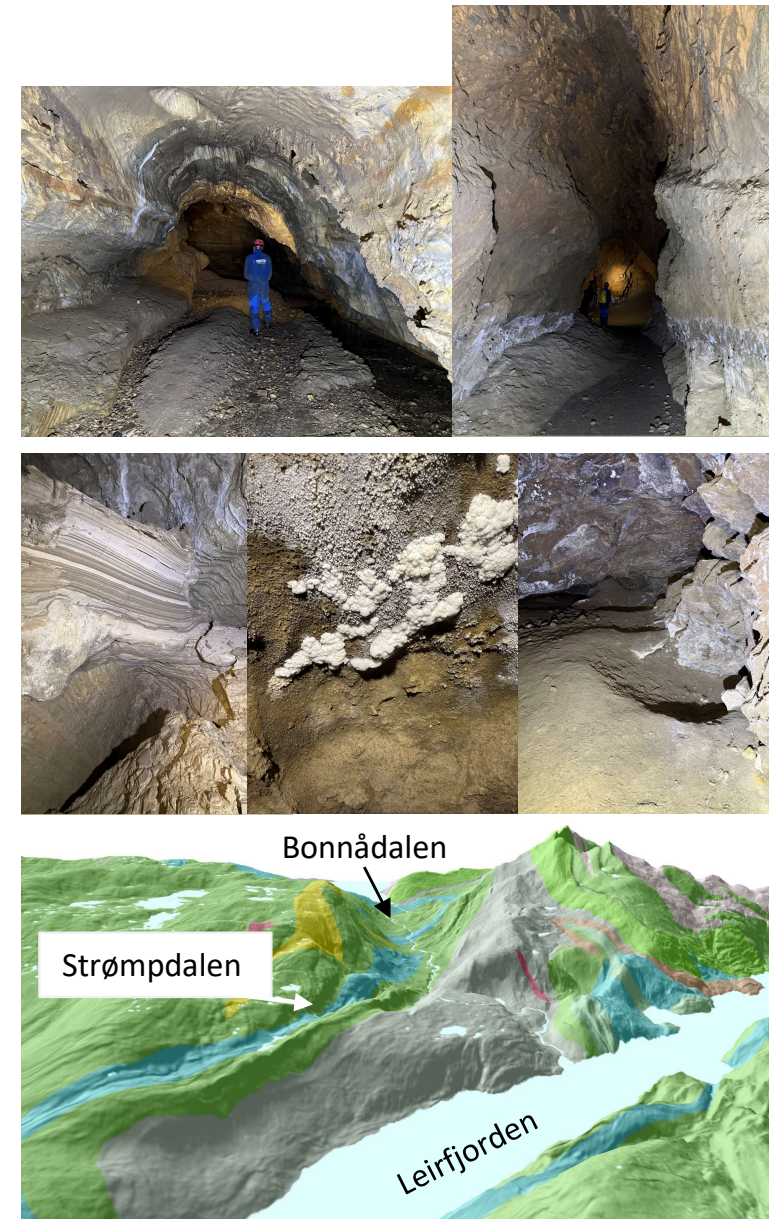
Karst projects in Sørfold

Strømpdalen, is a tributary valley of Bonnådalen in Sørfold municipality, situated in one of Norway's most significant karst regions. The surrounding area hosts some of the country's longest cave systems, including Tjorveraggie (>25 km) and Reinvikhulen (> 8 km). To the south, near Fauske, lies Svarthammerhola, which contains Norway's largest natural karst chamber. Further north, in Kjølpsvik, the Evocave project documented an Early Weichselian (ca. 75 ka) polar fauna, including polar bears and reindeer. In addition, U-Th dating of a relict flowstone from Stortuvhola cave yielded ages between 400 and 270 ka. Together, these findings demonstrate both the cave-forming potential of the highly soluble marble bedrock and the considerable potential for discovering old cave deposits that can provide insight into landscape development and paleoenvironmental change.

Strømpdalen contains numerous caves, dolines, ponors, caves streams and springs, representing a well-developed karst system with extensive subsurface drainage. Most of the cave systems in the area have been surveyed by local cavers, and cave maps are available. However, the cave morphology, sedimentary records and hydrology remain largely unexplored from a scientific perspective.

The project offers opportunities for collaboration among two to three students working on complementary aspects of the karst system, including:

- Geomorphology, sedimentology and paleohydrology of the cave systems
- Integration of surface and subsurface karst features using GIS
- Hydrological investigations of subsurface drainage system



Karst hydrology in Okshola-Kristihola and/or Stortuvhola

Stortuvhola and Okshola-Kristihola are relict cave systems developed during multiple glacial-interglacial cycles and preserve evidence of long-term karst evolution ([Pennos et al. 2026](#); [Skoglund & Lauritzen, 2010](#)). At present, both systems are integrated into active hydrological networks and are traversed by surface-derived streams, providing an opportunity to investigate contemporary groundwater flow and ongoing karst processes.

The project aims to characterize the active hydrological systems, including the hydrological connectivity between surface and subsurface drainage, the geometry and storage capacity of the aquifers, groundwater flow dynamics and water chemistry.

Methods may include monitoring of hydrological and meteorological parameters, discharge measurements, hydrological tracer experiments, water sampling and geochemical analyses, GIS-based mapping, cave surveying, vulnerability assessments.



Karst caves in Reingardslia, Rana

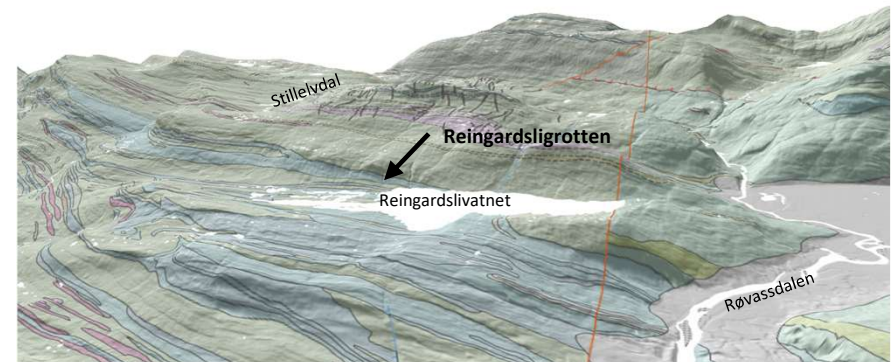
Rana municipality contains a high density of karst landscapes and cave systems. Previous studies have documented relict cave systems that developed during multiple glacial-interglacial cycles. In recent years, several Master's projects have focused on the glacial history, sea level changes, and karst and cave development in the area south of Svartisen.

There is potential for a project focusing on karst and cave development in the area between the lake Reingardslivatnet and Stillelvdal. Reingardsligrotta, a cave approximately 300 m long, is located upstream of the lake, and two smaller caves are associated with the subsurface flow path. The project should combine geomorphological and hydrological investigations to improve our understanding of the landscape development and karst processes in the area.

Objectives:

- Develop a conceptual model for the karst and cave development based on the cave survey, including documentation of the cave morphology, cave sedimentary records, and geomorphological mapping in the surrounding area.
- Investigate the active hydrological system and reconstruct past hydrological conditions. Assess the impact of glaciation on karst and cave development and evaluate how hydrological processes have changed over time.

Methods may include cave surveying, documentation of cave morphology, scallops analysis, sedimentological investigations of cave deposits, hydrological tracing experiments, discharge measurements, GIS analyses and geomorphological field surveys.



If you are interested in a master project on water- or cave-related topics,
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