

Master projects in karst, cave and water-related topics

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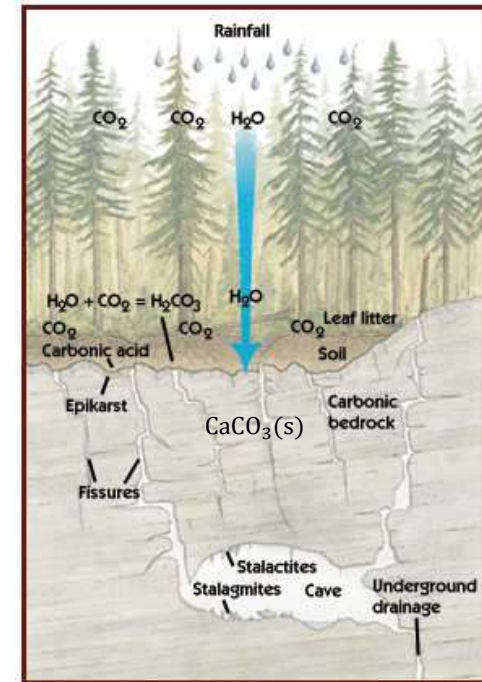
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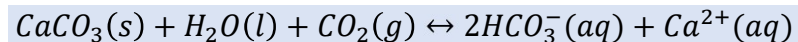
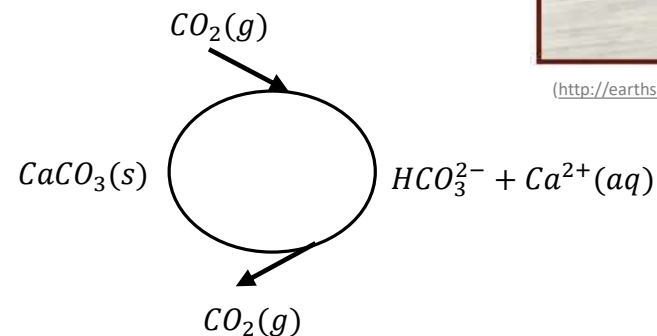
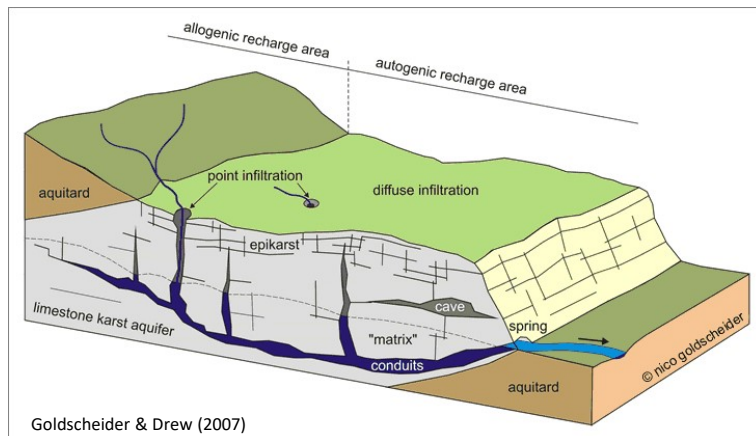
What is karst?

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

Dissolution of calcite



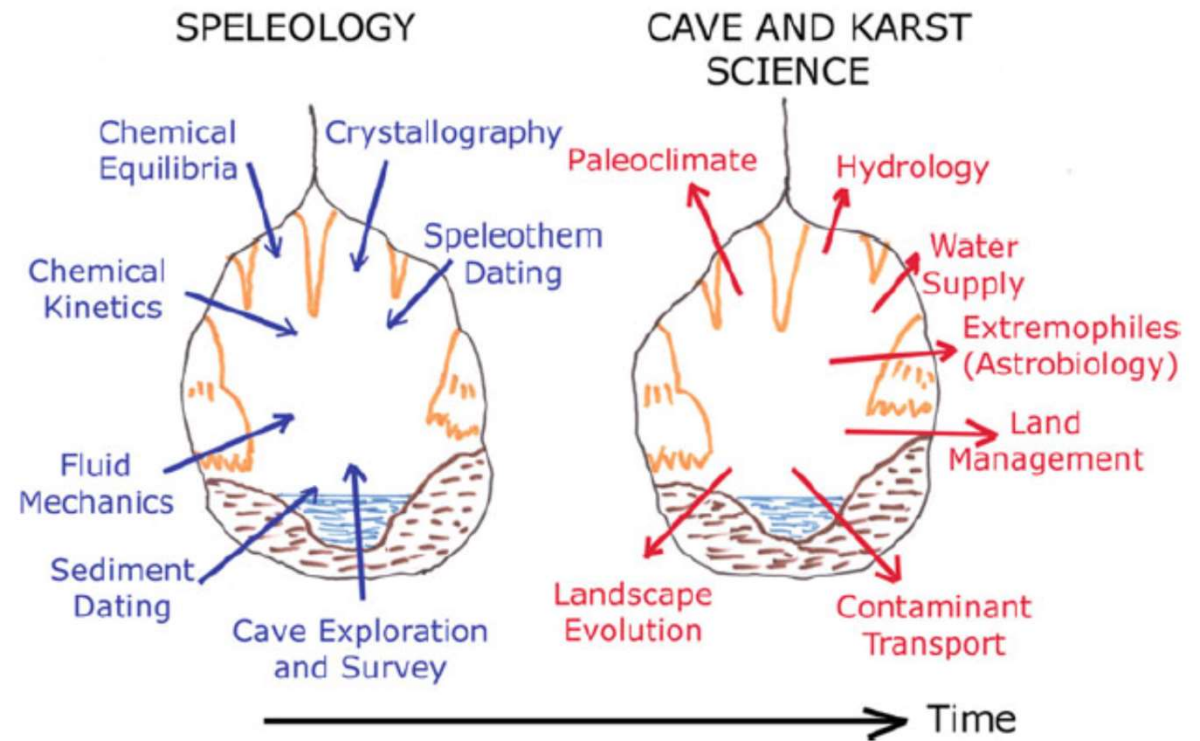
(<http://earthsci.org/processes/geopro/karst/karst.htm>)



What is the role of karst caves in science?



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 master projects

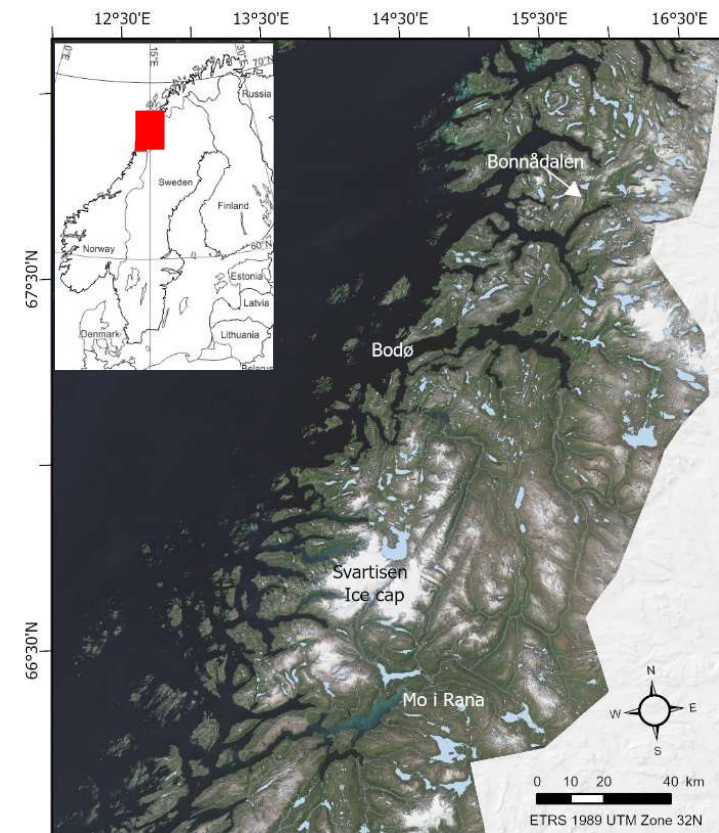
Background

Karst caves are developed by dissolution and morphological features from previous drainage conditions and hydrological regimes are preserved in the cave walls. Cave deposits comprise clastic sediments, speleothems, remnants of animals and plants, unique microbes and pristine surfaces that are a rare resource today. The stable environment with minimal outside influence makes the caves unique depositories for geological, faunal and climatic history. However, it also makes the caves vulnerable to impact since a footprint can remain for thousands of years. Caves are a red-listed nature type in Norway. New constructions such as wind farms and road routes affect new karst areas and can provide the general public with easier access to vulnerable caves. Increased interest in more challenging outdoor activities, and publicity in social media and reality shows have increased the traffic in cave and karst areas.

It is possible to work with **various topics within the theme of karst and caves:**

- cave development (speleogenesis) and landscape evolution
- karsthydrology

Field area: Nordland, probably Bonnådalen in Sørfold municipality or Rana municipality, depending on the number of students and their interests.



Karst and cave-related master projects

Possible research topics

- Make a plausible model for the cave development based on the cave survey and documentation of cave morphology and deposits, including speleothems, clastic sediments, bones and artefacts. Suggest when the cave was last active, if the deglaciation left any traces and its relation to landscape evolution.
- Hydrological investigations of active underground systems to assess the system's volume, flow route(s), residence time and dynamic function, water quality and contamination issues related to water supply, and the possible effects of changes in the drainage area.
- During recent years, microplastics have been demonstrated to be omnipresent. In the project CAVE-MP, we investigate the presence and distribution of microplastics in cave deposits and karst water, and there is a possibility for a master project investigating the presence of microplastics in Norwegian caves and karst water.

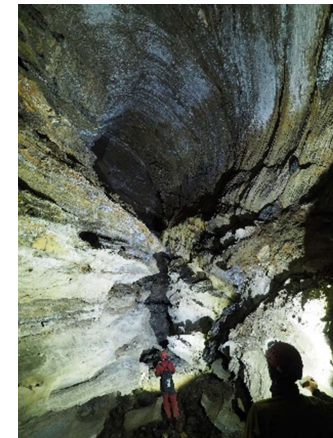
Methods

Cave survey, documentation of morphological features, scallops analysis, sediment investigations, U-series dating, radiocarbon dating, hydrological tracing experiments, discharge measurements, monitoring of hydrological and meteorological parameters, water sampling and analyses, GIS, photogrammetry, remote sensing (Lidar and InSAR data), vulnerability analysis, etc.

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

1-4 master projects

Fieldwork in caves is demanding (cold and dark) and requires at least two persons for safety!



Flood history and hydrodynamic function of Maaras cave, Greece

Maaras is an extensive river cave in northern Greece. The cave drains the Nevrokopi polje, a significant karst depression with a flat floor, and the cave is the spring of the Aggitis River, which drains through the Drama basin. Maaras cave is surveyed to a total length of about 12 km, and the trunk passage comprises a series of cave chambers connected by siphons that are accessible during the dry season. More than 30 m of sediment is deposited on the cave floor, and terraces of fluvial deposits are present along the cave stream.

Objective: Understand the hydrodynamic function of the extensive river cave and how and when sediments are deposited and transported through this system. Reconstruction of flood history and potential causes.

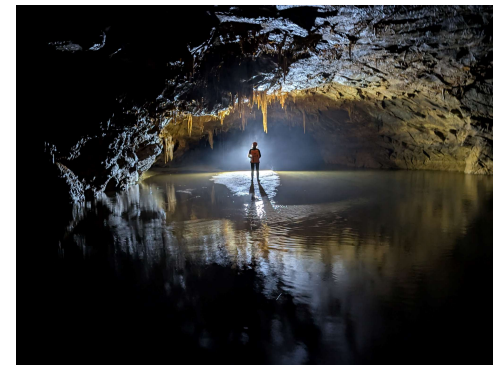
Make a conceptual model for the flood function of the cave system and the role of back flooding.

Methods: Analyses of hydrological data from automatic monitoring stations, analyses of water samples, stratigraphical investigations of sediments in terraces, sediment analyses, dating of cave deposits by applicable methods (OSL, ^{14}C or U-series), ERT data, etc.

Fieldwork: 5-10 days (Challenging conditions, no claustrophobia!)

Co-supervisor: Dr. Christos Pennos, Aristotle University of Thessaloniki, Greece

1-2 master projects



Groundwater projects

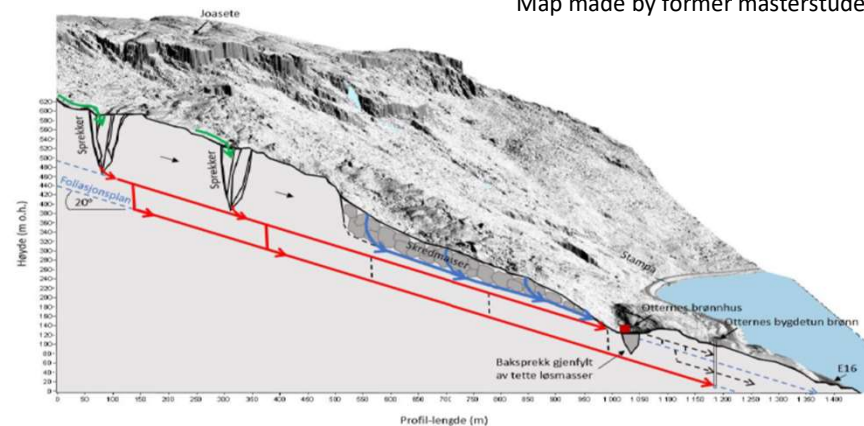
- If you are interested in working on projects related to groundwater issues such as water supply, contamination, subsidence, slope instability, etc., please get in touch with me.
- Previous collaborators include COWI, Norconsult, NGU (Geological Survey of Norway), Voss municipality and Western Norway University of Applied Sciences in Sogndal.



Suceptibility map showing areas i Bergen that are subsiding. Data from InSAR. Map made by former masterstudent Joakim Haukedal, 2017.



Recommended protection zones surrounding the water works at Bømoen, Voss, a new reserve water supply for Voss municipality. Map made by former masterstudent Line Haukanes, 2018.



Conceptual model showing two different drainage systems in the unstable rock slope of Joasete-Høgsete in Flåm. Model developed by former masterstudent Berit Soldal, 2018.



If you are interested in a master project on water- or cave-related topics,
don't hesitate to contact me at:

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or visit me at Room 717, Dep. of Geography, SV-building





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