2 PhD-positions available in thermal transfer in caves

Thermokarst project
(funded by the Swiss National Science Foundation, SNF)

The Swiss Institute for Speleology and Karst-Studies (SISKA) offers two PhD positions to enthusiastic students holding a relevant Master degree. SISKA is renowned for his expertise in cave and karst environments in Switzerland and abroad. The research project, funded by the Swiss National Science Foundation, deals with heat transfer in karst massifs and involves specialists from SISKA and FAST-Laboratory from the University of Paris-Saclay (Paris-Sud) and CNRS alongside with Swiss Universities (Neuchâtel, ETH).

As a PhD student you will be part of a dynamic, international research team and benefit from the doctoral program at University of Neuchâtel, with connections to most Swiss Universities and ETH. .

The first position is suitable to an Earth/Environmental-scientist with interests in groundwater and heat flow and willing to conduct intensive cave monitoring. The second position is designed for a student with strong modelling skills and interested in fluid dynamics and heat transfer.

The research program will last 4 years and the PhD must be achieved within this time frame. The aim of this project is to produce a founded assessment of heat and mass transfers in karst systems to address the following questions:

1. How significant is air ventilation for heat transfer in karst massifs?
2. What is the typical thermal reaction time of caves to climate change?
3. Does condensation water in karst contribute to a significant degree to groundwater recharge of karst aquifers? Under which circumstances?

Results of the project are important for paleoclimate reconstructions from speleothems, for conservation of archaeological caves, for groundwater, for geothermal extraction, etc. The attached abstract provides more information about the project.

Position 1 (heat transfer monitoring)

Your mission:

- Participate to the definition of a global conceptual model of heat transfer in karst massifs to be challenged along the research program
- Refining the existing monitoring concept
- Set up a simple and efficient concept for the data management
- Select, buy, and set up monitoring devices
- Acquiring field measurements and observations
- Analyze and interpret existing and acquired data, and link them to the literature
- Integrate field data with modelling results
- Contribution to scientific papers and leadership in manuscript preparations.

Expected skills:

- Team working
- Sens of synthesis
- Knowledge in environmental sciences, if possible geosciences
- Interest and capacities to lead field work in caves
- Interest and capacities in selecting, assembling and set up monitoring devices in the field
- Interest and capacities in analyzing data (statistics & data presentation)
- Interest and sound understanding of fluid mechanics and heat transfers
- Writing skills in English (papers)
- Master degree in Geosciences or environmental sciences

Position 2 (Heat transfer modelling)

Your mission:

- Participate to the definition of a global conceptual model of heat transfer in karst massifs to be challenged along the research program
- Participate to the translation of the model into equations
- Coding the solving of equations in Comsol Multiphysics
- Take part to the setup of monitoring devices in the field and make observations
- Link modelling results to field data
- Contribution to scientific papers and leadership in manuscript preparations
- Collaborating and bridging two teams, one in Paris-Saclay, the other one in La Chaux-de-Fonds. The student will work on both sites, La Chaux-de-Fonds and Saclay.

Expected skills:

- Team working
- Interests in fluid mechanics and heat transfer in natural underground environments
- Interest and capacities in numerical simulation
- Interest in fieldwork in caves
- Writing skills in English (papers)
- Master degree in fluid dynamics, physics or Geomodelling

To apply, please send by email to Prof. Pierre-Yves Jeannin (pierre-yves.jeannin@isska.ch) with:

- A cover letter explaining your overall motivation for entering this specific PhD program;
- Your curriculum vitae;
- The list of the courses following along your Bachelor's and Master's degrees;
- An abstract of your Master's Thesis
- Names, phone numbers, and email addresses of at least two referees

The deadline for applications is set at **January 31st, 2020**.