Measuring and modelling precipitation to improve natural hazard management in Longyearbyen

We are looking for a student with a meteorology background that could help us study the variability of precipitation in and around Longyearbyen as part of the transdisciplinary 'Risk governance of climate-related systemic risk in the Arctic (Arct-Risk)' project. The aim of this work is to map local precipitation and snow coverage using a combination of field measurements and operational weather model output. The field component will consist of deploying, monitoring, and maintaining a network of rain gauges and snow depth sensors. In addition, we plan a calibration and validation study of different precipitation / snow depth sensors and manual measurements to increase the knowledge of the measurement uncertainty. This project will provide experience working with meteorology in an applied setting in the Arct-Risk project, while combining both observed and modelled datasets. In addition, you will get hands-on Arctic fieldwork experience.

Precipitation is a climate variable with high impact and high uncertainty in the Arctic. Long-term predictions indicate increased precipitation a warmer Arctic, resulting in both greater seasonal precipitation and higher precipitation intensities. Additionally, a larger proportion of the precipitation will fall as rain rather than snow. Changing precipitation patterns will affect natural hazards such as landslides, snow avalanches, and floods which often result from extreme precipitation events. These hazards threaten human life and infrastructure in Longyearbyen, the largest settlement in the Svalbard archipelago and the setting for this work.

Precipitation in Svalbard typically falls in high wind situations, associated with for example frontal passages or cold-air outbreaks. In these situations, precipitation gauges fail to accurately measure all the falling precipitation, leading to "undercatchment" and hence inaccurate in-situ precipitation measurements. Inaccurate precipitation measurements, varied topography, and complex air-sea-land interactions close to Longyearbyen serve as obstacles to resolving the local precipitation variability around Longyearbyen. Importantly, this uncertainty presents a challenge for avalanche forecasting and other natural hazard management.

If you are interested in an active role in the field work as well as analyzing both observed and modelled precipitation data programmatically (MATLAB or Python) you could be the student we are looking for! The favored field season is Spring 2022.

Other preferred skills:
Working proficiency in a Scandinavian language.
Driver's license Experience from Arctic winter conditions.

For more information or questions, please contact
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To read more about the Arct-Risk project, visit
https://www.ntnu.edu/iot/arct-risk

Photo Holt Hancock