EDI internship: Unravelling the mysteries of air quality above polar snow using a new model

Lead supervisor: Markus M. Frey

Project description:

Climate and environment in polar and high-altitude regions are particularly sensitive to anthropogenic perturbation. Understanding the natural processes in the background atmosphere is essential to assess the human contribution to environmental change. Examples are the nitrogen oxides NO and NO2, which alter concentrations of ozone (O3), a pollutant and greenhouse gas, and the hydroxyl radical (OH), which is responsible for the removal of many other atmospheric pollutants (e.g. CO, CH4). Nitric acid (HNO3) is a related species as it is the atmospheric sink of reactive nitrogen. However, its uptake and release by snow packs is still not fully understood. You will use an existing numerical model to understand HNO3 uptake and release of snow at a cold site on the high East Antarctic Plateau. The model written in Matlab has recently been developed at the British Antarctic Survey as part of a PhD thesis. You will validate the model with existing atmospheric and snow data collected at Kohnen station during the 2016/17 season and compare your results to published findings at two other Antarctic sites (Dome C, Halley).

Job description:

In a first step you will get familiar with the model by reproducing model runs carried out previously at Dome C and Halley. You will then adjust model parameters for conditions at Kohnen station and validate the model using existing atmospheric and snow data collected during the 2016/17 season. You will compare your results to published findings at two other Antarctic sites (Dome C, Halley) to evaluate the main drivers of HNO3 air-snow exchange at the new site. In a final step, you will speed up computational speed by transferring the model (or parts thereof) into the Fortran language. At the end of your project you will writeup your findings in a project report.

Skills specification:

Required are strong numerical skills (knowledge of a programming language such as Fortranor similar); required enrolment in a quantitative STEM program (physics, chemistry,environmental sciences or similar); desirable is exposure to/ interest in environmentalscience.

Project work:
The project can be carried out remotely, with frequent interactions via zoom (as needed but at least 2 times per week).