



**Project acronym:** SUGS

**Project title:** Sensing and Understanding Greenland's Snowfall

**Project leader:** Hamish Pritchard, British Antarctic Survey, United Kingdom

**Discipline:** Earth Sciences & Environment: Global change & Climate observation

**Station(s):** Greenland Institute of Natural Resources (Greenland/Denmark), Villum Research Station (VRS) (Greenland/Denmark), The DMI Geophysical Observatory Qaanaaq (Greenland/Denmark)

Greenland is the world's largest single source of sea level rise and will likely remain so for decades to come. Unfortunately, the best available ice-sheet models disagree by over a trillion tonnes on how much ice Greenland lost over just the last few years, making vital global sea-level predictions to the end of the century very uncertain. Snowfall is almost the sole source of Greenland's ice mass but snowfall events are barely measured by a scattering of little gauges that hopelessly undersample the rugged coastal landscape and are prone to large measurement biases. This project will help fill a major gap in our knowledge of Greenland's climate in order to make better predictions of future ice loss. Its objectives are to use accurate, large-scale field observations of snowfall to 1) make the first directly-representative test of how well climate models currently reproduce snowfall events, and 2) enable these models to be tuned to improve their predictive skill. I will deploy (remotely) a fundamentally new type of snowfall sensor near stations GINR, Qaanaaq and Villum to run over 2021/22, sampling the winter climates of coastal south-west, north-west and north-east Greenland and adding to an existing pilot site in the south-east. These sensors have smaller errors than previous instruments and measure over far larger areas, at a scale directly comparable to climate-model grids. This means that they avoid major sources of bias and uncertainty that have so far plagued studies of Greenland's climate and surface mass balance processes.