



Project acronym: COSIPY NE

Project title: COupled Snowpack and Ice surface energy and mass balance model in PYthon applied to field sites in Northern Europe

Project leader: Christoph Schneider, Humboldt-Universität zu Berlin, Germany

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

Station(s): Tarfala Research Station (Sweden), Abisko Scientific Research Station (Sweden)

Original project description: The project aims at a better understanding of the spatial structure of energy and mass exchange between atmosphere and ground in arctic environments from snow, ice and permafrost ground. Energy and mass fluxes at the scale of landscapes are depending on micro-scale features that often are not adequately resolved in meso- or large-scale models. For the integration of the effects of small-scale heterogeneity into earth system models scale-consistent understanding is crucial to providing parameterizations that account for micro-scale variability and that can nevertheless be up-scaled across different arctic environments. We aim at contributing to this by improving input datasets to the COupled Snowpack and Ice surface energy and MAAss balance model in Python ([COSIPY](#)) based on remote sensing data from Sentinel interferometric Synthetic Aperture Radar (SAR) using the newly established Open Source SAR Investigation System ([OSARIS](#)). At all three sites (Tarfala, Abisko, Ny Alesund) extensive mapping of ground based features and micro-climate is necessary to allow for the interpretation and integration of OSARIS-derived time series of surface characteristics and surface change at high spatial and temporal resolution. In order to improve the representation of sensible and latent heat fluxes in COSIPY we benchmark COSIPY runs by using the sophisticated but computationally demanding atmospheric Parallelized Large-Eddy Simulation (LES) Model [PALM](#). In pursuit of the latter we carry out eddy covariance measurements with an own system on Storglaciären at Tarfala Research Station and use existing LES data from Stordalen near Abisko and Ny Alesund (Svalbard) for the other field sites.