ESA SnowLab – Microwave and Structural Measurements of Alpine Snow

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The aim of the ESA SnowLab project is to provide a comprehensive multi-frequency, multi-polarisation, multi-temporal dataset of active and passive microwave measurements over snow-covered grounds. The dataset is used to further investigate the relationship between effective snow- and ground parameters and their specific microwave response, measured by radars and radiometers. In recent years several microwave snow campaigns were conducted leading to new insight in the scattering- and emission processes of microwaves. The findings stimulated a number of microwave model developments and field campaigns, as well as hardware developments. An important part for the development of microwave models is the micro-structural characterisation.

The ESA SnowLab project covers 3 campaigns with the ESA SnowScat X- to Ku-Band scatterometer and macro- and micro-structural analysis of Alpine winter snow. To extend the available sensors and benefit from synergies we cooperate with other projects such as the MicroVegSnow project (L- and X-Band radiometers), ETH Zurich (GPS measurements), and investigate the development of new hardware to enhance the frequency range of SnowScat. Furthermore, we benefit from the recently established new WSL developed “Swiss AlpSnowLab for Climate-Research and Remote Observations” (SASCRO) test-site at Davos Laret, Switzerland that became available in November 2016.

The first winter campaign was conducted at Gerstenegg, Switzerland in winter 2015/16. The aim of this campaign was the further testing and development of the SnowScat tomographic hardware and the data acquisition of multi temporal, multi-frequency and multi-polarisation tomographic profiles. The second campaign is conducted during the ongoing winter at the new site Davos Laret. Here the emphasis is on the acquisition of the backscatter signature of the evolving snowpack throughout the winter with snow characterisation at bi-weekly to weekly intervals (Snow Micropen, traditional pit profiles) and, for selected snow profiles, micro CT imagery. The campaign is conducted in close collaboration with the MicroVegSnow project. The collaboration allows using synergies in the snow characterisation and to extend the SnowScat measurements with radiometric measurements at L and X-Band.

In our presentation we will show the campaign-setup in Gerstenegg and Laret, including the used hardware and technologies as well as lessons learned. Furthermore, we will discuss the results obtained during the campaign at Gerstenegg and first results of the ongoing campaign at Laret.