

Comparison of in-situ and ex-situ metamorphism in near-surface snow stratifications at Dome C

Henning Löwe (1), Matthias Jaggi (1), Margret Matzl (1), Martin Schneebeli (1), Ghislain Picard (2), Laurent Arnaud (2), and Amaelle Landais (3)

(1) WSL Institute for Snow and Avalanche Research, SLF, Snow and Permafrost, Davos Dorf, Switzerland (loewe@slf.ch), (2) Institut des Géosciences de l'Environnement, Saint Martin d'Hères, France, (3) Laboratoire des Sciences du Climat et de l'Environnement, Gif-sur-Yvette Cedex, France

An important step towards a better understanding of the formation of climate signals in near-surface polar snow/firn is the interplay of post-depositional processes with a given stratification reflecting the characteristics of the accumulation. As one of the key processes, snow metamorphism is controlled by the seasonal variation of near-surface temperatures/gradients. For low accumulation sites this causes a coarse sublimation-deposition pattern superimposed on a fine-layered stratification. To understand these processes and potential consequences for the formation of climate signals we developed a portable rack of four macroscopic metamorphism boxes in which large (0.4m x 0.4m x 0.3m), stratigraphically heterogeneous snow blocks can be subjected to different temperature forcings under sealed conditions after excavation from the natural snowpack. The rack was deployed at Dome C during the two months in the Antarctic Summer 2017/2018 to detail the role of metamorphism within the IPEV project "Snow properties evolution in a changing climate in Antarctica". In the campaign we conducted ex-situ sensitivity experiments for the evolution of signals (microstructure, isotopes) and compared it to the concurrent in-situ dynamics that was monitored by field measurements. In this presentation we report on first results of the evolution of stratigraphy from the sensitivity experiments under four temperature/gradient scenarios that have been analyzed by micro-computed tomography.