The impact of early summer snow properties on land-fast sea-ice X-band backscatter

Stephan Paul (1), Sascha Willmes (1), Mario Hoppmann (2), Priska Hunkeler (2), and Günther Heinemann (1)
(1) Environmental Meteorology, University of Trier, Behringstr. 21, 54296 Trier, Germany (paul@uni-trier.de), (2) Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bussestr. 24, 27580 Bremerhaven, Germany

Snow cover on sea ice and its impact on radar backscatter, particularly after the onset of freeze-thaw processes requires increased understanding. We present a data set that comprises in-situ measured snow properties from the land-fast sea ice of the Atka Bay, Antarctica, in combination with high-resolution TerraSAR-X backscatter data. Both data sets are discussed for the transition period from austral winter to summer (November 2012 - January 2013). The changes in the seasonal snow cover are reflected in the evolution of TerraSAR-X backscatter. We are able to explain between 62 % and 80 % of the spatio-temporal variations of the TerraSAR-X backscatter signal with up to three snow-pack parameters by using a simple linear model. Especially after the onset of melt processes, the majority of the TerraSAR-X backscatter variations are influenced by snow depth, snow/ice-interface temperature and snow-pack grain size and thereby imply the potential to also retrieve snow physical properties from X-Band backscatter.