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

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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.