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Density, densification and the evolution of the microstructure in polar firn

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During the densification of polar firn density develops seasonal cycles best seen at densities between 650 kg/m3 and 750 kg/m3. Close to the surface density fluctuations appear random mainly because of the random deposition of the snow pack over the seasons. We present for the first time high resolution density data together with 2d-microstructure (e.g. grain size). It seems that stratigraphic features (e.g. fine- or coarse-grained firn, layers of hard or soft firn or depth-hoar layers) probably control the initial densification of firn but loose importance with depth and time. At higher densities (above 620 kg/m3) most likely impurities with their seasonal distribution begin to dominate the densification process. We discuss the possible links between the densification process and the evolution of the microstructure in polar firn.