Recrystallization studies from deformation experiments on artificial and natural ice: experimental set-up and preliminary results

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At the bottom of polar ice sheets where temperature is close to or above 263K, both static and dynamic recrystallization can favour the rapid growth of large ice crystals and reset their c-axis patterns (Kizaki, 1969; Gow and Williamson, 1976; Budd and Jacka, 1989; Thorsteinsson et al., 1995; Azuma et al., 2000). Similar phenomena have been observed in glaciers having undergone important strain and stress gradients (Kamb, 1959; Anderton, 1974; Samyn et al., 2008). Although both static and dynamic states have been studied experimentally (e.g. Kamb, 1972; Huang et al., 1985; Wilson and Russell-Head, 1982), no unequivocal indicator has been found yet to clearly distinguish between separate effects of both static and dynamic states. Recrystallization processes have significant implications for ice-flow modelling and paleo-climate interpretation. In this regard, the formation conditions, for instance, of large-grained, annealed textures from deep bottom ice as found at NGRIP or NEEM are still under strong debate. In order to contribute to the body of knowledge in this field, we present and discuss here the set-up and preliminary results from various types of deformation experiments conducted in the laboratory (uniaxial creep tests, constant strain rate pure shear and constant strain rate simple shear tests).