



High spatial resolution ice crystallography of basal ice facies at Glacier de Tsanfleuron, Switzerland.

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Basal ice is ice that has acquired a distinctive suite of characteristics as a result of processes operating at or near the bed of an ice mass. Blocks of basal ice have been sampled from the frontal margin of Glacier de Tsanfleuron, Switzerland, for physical and chemical analysis, particularly ice crystallography. Basal ice types have been classified into six key facies to allow generalised mechanisms of formation to be investigated and proposed for each. Basal ice facies that were recovered as blocks include: Floor ice formed on sloping bedrock surfaces and in cavity hollows, Floor ice incorporated onto the sole of the glacier, and Dispersed facies ice. The orientations of sample blocks were recorded relative to local flow direction and glacier margin. Thin sections were cut and analysed using an automated crystal fabric analyser, and crystal orientations data were plotted as hemispheric projections and analysed using Eigen analysis.

Results indicate that crystal orientations coupled with other basal ice characteristics allow conclusions to be drawn relating to the formation of each ice facies, for example, origin of Dispersed facies ice is re-evaluated as forming from fractured bedrock incorporated from a point source during refreezing processes at the bed as opposed to the incorporation and metamorphism of floor ice as previously considered. The high spatial resolution at which these sample blocks have been analysed shows detailed ice crystal orientations within a three dimensional matrix. We conclude that ice crystallography can form an important tool in basal ice research which to date has been under-represented.