

The importance of preserving basal ice under appropriate subdued red-orange-light conditions for reconstructing past ice-sheet retreats and advances

Tuesday 16 September 2025 09:45 (20 minutes)

Small pieces of rock and sediment found at the base of ice cores can be used to reconstruct the first appearance, evolution, and age of ice sheets, as well as the vegetation that existed prior to ice-sheet formation. However, accurate reconstructions, particularly those based on luminescence dating methods for determining burial ages, require that these materials remain unexposed to light after drilling. Even brief light exposure can partially reset the luminescence signal and thus compromise dating accuracy. Implementing dark (subdued red-orange-light) extraction techniques in the drill surfacing and core extraction process is a relatively simple adjustment that can greatly enhance the scientific value of basal ice samples. We present field experiences and techniques from the EastGRIP (Greenland), Little Dome C (Antarctica), and Muller's Ice Cap (Arctic Canada) drilling projects, as well as results from the EastGRIP core. We emphasize the importance of adopting dark extraction protocols within the ice-core drilling community to expand the global archive of basal material suitable for luminescence dating and to improve our understanding of ice sheet formation and dynamics.

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Session Classification: Oral sessions

Track Classification: Subglacial drilling and sampling