



Configuration of the subglacial drainage system structure beneath Mittivakkat Gletsjer, Greenland, using dye tracer experiments

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Mittivakkat Gletsjer in Southeast Greenland is the most studied local glacier in Greenland and often used as a representative glacier for this region. However, little is known about the structure and morphology of its subglacial drainage system despite that this information is relevant for glacier hydrology, glacier dynamics and subglacial chemical weathering processes. In August 2014, we conducted a series of dye tracing experiments using Rhodamine WT. Dye was injected in moulins along transverse and longitudinal transects to examine spatial differences in the englacial and subglacial drainage network. We also conducted tests on specific moulins at different times throughout the day to measure potential diurnal variations in meltwater transit time. Most injections showed a well-defined single peak return curve, indicating routing through an efficient channelized subglacial system. In some cases the peak was followed by a variable diffuse signal, indicating meltwater interaction between a channelized system and an inefficient distributed system. At some injection sites, we also observed multi-peak return curves, suggesting that the channelized system consisted of several channels. Unexpectedly, injections on the upper part of the glacier showed faster mean water velocities (1.5 m/s) than injections near the glacier terminus (0.8 m/s).