



Annual and seasonal glacier dynamics at an overdeepened valley glacier tongue

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Elucidation of the influence of subglacial topography on glacial glacier dynamics is important for understanding the rate of contribution of present ice sheets and glaciers to sea level change as well as the locations and rates of subglacial erosion. Numerous factors control this response, including, for example, basal debris continuity, meltwater availability and climate. Despite overdeepenings in the bedrock topography beneath glaciers being commonplace, the subglacial processes and conditions associated with them remain poorly understood. For example, anticipated changes in hydrology produced by the steepness of the adverse slope in relation to the ice surface slope should influence subglacial water pressure and basal sediment layer thickness, with associated implications for ice-bedrock coupling. Targeting Findelengletscher, Switzerland, as a test site, we present a multifaceted methodology combining high resolution photogrammetry (UAV) and bed topography estimations (GPR) for deriving velocity, melt, ice thickness and bedrock morphology. From these methods, a complete 3D model can be produced of the ice thickness and bedrock topography can be produced. The information is then used to speculate how these could affect subglacial hydrology. Using feature tracking and comparing to climatic conditions it may also be possible to estimate how weather conditions can affect glacial processes.