Distributed energy-balance glacier melt-modelling in the Donjek Range of the St. Elias Mountains, Yukon Territory, Canada: model transferability in space and time

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Modelling melt from glaciers is crucial to assessing regional hydrology and eustatic sea-level rise. To investigate melt-model transferability, a distributed energy-balance melt model (DEBM) is applied to two glaciers of opposing aspects in the Donjek Range of the St. Elias Mountains, Yukon Territory, Canada. An analysis is conducted in four stages to assess the transferability of the DEBM in space and time: (1) locally derived model parameter values and meteorological forcing variables are used to assess model skill; (2) model parameter values are transferred between glacier sites and between years of study; (3) measured meteorological forcing variables are transferred between glaciers, using locally derived parameter values; (4) both model parameter values and measured meteorological forcing variables are transferred from one glacier site to the other, treating the second glacier site as an extension of the first. The model has high transferability in time, but has limited transferability in space.