

Investigating seasonal variations in rock glacier dynamics

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Periglacial monitoring has highlighted seasonal and inter-annual variations in rock glacier dynamics. Temperature forcing, through heat conduction, has been proposed as one of the key processes to explain these kinematics variations. But this mechanism has not yet been quantitatively assessed against real-world data.

We present a numerical model that couples heat conduction and an empirical creep model for ice-rich frozen soils (Arenson, 2005). We use this model to investigate the dynamic response of alpine permafrost to external temperature variations.

We compare the modeling with the PERMOS monitoring network data, which include several years of borehole temperature data and variations in surface velocity. These data allow us to conduct a direct comparison and test our model.

We are able to model velocity variations from temperature forcing in the right order of magnitude but, in general, these are underestimated, in particular for thicker rock-glaciers.