Numerical sensitivity analysis of a rock glacier flow model versus detection of an internal sliding occurrence

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This work concerns the rock glacier flow model introduced, in its basic form, by Kannan and Rajagopal in [1] and extended with inclusion of temperature effects by Kannan, Rajagopal, Mansutti and Urbini in [2]. This one is based on the general conservation laws (momentum, mass and energy) and takes into account the effect of shear rate, pressure and rocks and sand grains volume fraction onto viscosity, also by implementing the effects of local pressure melting point variation. Here we present the results of a sensitivity analysis of the parameters developed by shooting the location of the internal sliding occurrence, induced by the presence of rocks and sand grains trapped within the interstices of the glacier, and the value of the shear velocity. The case of the Murtel-Corvatsch glacier in Switzerland is considered for the availability of the detailed description based on measured data published by Arenson, Hoelzle and Springman in [3]. The numerical results obtained improve those ones presented in [1] and show clearly the contribution of each numerical and functional parameter of the model. They also exhibit a very good agreement with observations which makes this modelling approach very promising for general application.


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