



Modeling the evolution of Djankuat glacier, Caucasus, Russian Federation from 1752 until 2100 AD

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We modelled the past and future evolution of Djankuat glacier, a northwest-facing temperate valley glacier near the border of the Russian Federation and Georgia, which has been selected as a 'reference glacier' for the Caucasus region by the WGMS. A 1D coupled ice flow-mass balance model was constructed and calibrated to simulate its past evolution since 1752 AD. The model is forced by reconstructed temperature and precipitation data from surrounding meteorological stations and proxy data. Future projections under different scenarios were carried out until 2100 AD. Supraglacial debris cover was included as well as it influences the glacier evolution depending on its thickness, properties and spatial/temporal distribution. The main results show that, since 1752 AD, the Djankuat glacier has lost a surface area of 1.5 km², while it retreated by 1.5 km until 2017. Some minor stabilization and/or readvancements of the glacier have occurred, but the general trend shows an almost continuous retreat since the 1850s. Future projections exhibit a further decline of the glacier, even under constant present-day climatic conditions. The presence of an increasingly widespread supraglacial debris cover is hereby shown to significantly delay glacier retreat.