Supplementary material for the article "The new IGRICE model as a tool for studying the mechanisms of glacier retreat"

Table S1. The main user-defined parameters of the IGRICE model are categorized by type. Each parameter is provided with its possible range, source, and type of setting (current and planned).

Type	Parameter	Range	Source (current)	Source (planned)	Fixed or tuning (current)	Fixed or tuning (planned)
Geo data	General convexity of topography	Convex/concave	Subjective	Subgrid topography data	Fixed regionally	Fixed regionally
	Glacier length	Any	Glacier inventories	Generalized gridded glacier data ("hypothetical glacier")	Fixed regionally	Fixed regionally
	Glacier volume	Any	-//-	-//-	Fixed regionally	Fixed regionally
	Altitudinal zones	Any	-//-	-//-	Fixed regionally	Fixed regionally
	Area fraction of altitude zones	0-1	-//-	-//-	Fixed regionally	Fixed regionally
	Slope of altitude zones	0-90°	DEM data	-//-	Fixed regionally	Fixed regionally
	Glacier azimuth	0-360°	Glacier inventories	-//-	Fixed regionally	Fixed regionally
	Large-scale slope in grid cell	0-90°	DEM data	Subgrid topography data	Fixed regionally	Fixed regionally

	Maximal height in grid cell	Any	DEM data	-//-	Fixed regionally	Fixed regionally
	Slope of rocks	0-90°	DEM data (= large-scale slope in grid cell)	DEM data (= large-scale slope in grid cell)	Fixed regionally	Fixed regionally
	Fraction of thin debris on surface in the lowest zone	0-1	Observations (from the literature)	Parametrization of debris evolution	Fixed regionally	Not a predefined parameter
	Fraction of thick debris cover in each zone	0-1	-//-	-//-	Fixed regionally	Not a predefined parameter
	Fraction of avalanche feeding	0-100%	-//-	Parametrization	Fixed regionally	Fixed regionally
Glacier dynamics parameters	α_m	Any	Calibration	Statistical parametrization	Tuning	Fixed regionally
	α	Any	Calibration	-//-	Tuning	Fixed regionally
	W	Any	Calibration	-//-	Tuning	Fixed regionally
Climate data	Snow concentration coefficient in each zone	Any	Calibration and physical reasoning	Parametrization	Tuning	Not a predefined parameter
	Temperature at the glacier bottom	Any below 0°C	Climate data (mean annual air temperature)	Climate data (mean annual air temperature)	Fixed regionally	Fixed regionally

	Temperature of rocks	Any	Climate data (typical maximum rock surface temperature in ablation season)	Explicit solving of rock surface energy-balance equation	Fixed regionally	Not a predefined parameter
	Julian day of the annual mass balance calculation	Any	Observations (from the literature)	Climate data (air temperature seasonal course)	Fixed regionally	Fixed regionally
Parametrization option	$\boldsymbol{LW_{rock}}$	On/Off	Calibration and physical reasoning	The best option according to global calibration	Tuning	Fixed globally
	Debris on ice surface (for ice albedo parametrization)	On/Off	Observations (from the literature)	Parametrization of debris evolution	Fixed regionally	Fixed regionally
	Shielding effect of debris cover	On/Off	-//-	-//-	Fixed regionally	Fixed regionally
	Snow albedo parametrization	[39] / [40] / [41] / [69] / BATS	Calibration	Development of new parametrization	Tuning	Fixed regionally or globally
	Precipitation partitioning	[70] / BATS	-//-	The best option according to global calibration	Tuning	Fixed globally
Empirical constant	$\boldsymbol{c_d}$	0.5 for convex and 0.25 for concave topography	Physical reasoning	Physical reasoning	Fixed globally	Fixed globally
	Heat flux to ice G during ablation season	Any	Typical mean value from the literature	Typical mean value from the literature	Fixed globally	Fixed globally
	Surface layer depth	Any	Calibration and physical reasoning	Parametrization	Fixed globally	Not a predefined parameter