Appendix B Discrete interaction example of finite ice melting and ice mass losses

This appendix brings forward an illustrative example calculation in 10 steps of the FMLI model (21-33) according the FCEI concept (11-20) in dimensionless form (M_U=1, i=1) presented in M-L space, (Table B-1 and Fig. B-1).

Table B-1. Discrete numerical interaction model of ice melting in 10 steps

M	$L'(M)$ (21)*	M_U-M (22)	$M/(M_U$-$M)$ (26)	$I_F(L,M)$ (27)	$L(M)$ (28)	$W_F(M)$ (29)	M	$L(M)$	I_F/M	W_F/W
0.0	**0.0**	**1.0**	**0.00**	**0.00**	**0.00**	**0.000**	**----------**		**0**	**0**
0.1	**0.1**	**0.9**	**0.11**	**0.05**	**0.15**	**0.000**	**I---------**	**I**	**0.54**	**0.04**
0.2	**0.2**	**0.8**	**0.25**	**0.12**	**0.32**	**0.001**	**II--------**	**III**	**0.58**	**0.07**
0.3	**0.3**	**0.7**	**0.43**	**0.19**	**0.49**	**0.005**	**III-------**	**IIIII**	**0.63**	**0.12**
0.4	**0.4**	**0.6**	**0.67**	**0.28**	**0.68**	**0.014**	**IIII------**	**IIIIIII**	**0.69**	**0.17**
0.5	**0.5**	**0.5**	**1.00**	**0.39**	**0.89**	**0.028**	**IIIII-----**	**IIIIIIIII**	**0.77**	**0.23**
0.6	**0.6**	**0.4**	**1.50**	**0.53**	**1.13**	**0.053**	**IIIIII----**	**IIIIIIIIII I**	**0.88**	**0.30**
0.7	**0.7**	**0.3**	**2.33**	**0.72**	**1.42**	**0.094**	**IIIIIII---**	**IIIIIIIIII IIII**	**1.03**	**0.38**
0.8	**0.8**	**0.2**	**4,00**	**1.01**	**1.81**	**0.158**	**IIIIIIII--**	**IIIIIIIIII IIIIIIII**	**1.26**	**0.49**
0.9	**0.9**	**0.1**	**9,00**	**1.56**	**2.46**	**0.265**	**IIIIIIIII-**	**IIIIIIIIII IIIIIIIIII IIII**	**1.73**	**0.65**
1.0	**1.0**	**0.0**	**∞**	**∞**	**∞**	**∞**	**IIIIIIIIII**	**IIIIIIIIII IIIIIIIIII IIIIIIIIIIIIIII**	**∞**	**∞**

*Note: numbers in parenthesis () denotes the numbers of appropriate equations in the body text

The dimensionless term (26) $M/(M_U$-$M)$ (Table B-1) expresses the physical rate $H(M)/Q(M_U$-$M)$ of increasing environmental heat energy $H(M)$ (25) of overall climate system changes and the simultaneous losses of the thermal capacity $Q(M_U$-$M)$ (24) of ice sheets due to melting of mass M of ice. The positive heat flow accelerates the accumulation of ice mass losses $I_F(L,M)$ (27, integral of 26) due to interactions of ice melting M and ice mass losses L out of finite ultimate mass M_U. This acceleration is quantified by the interaction intensity parameter i calculated from the observed data. The possible melting out point M_M is presented in M-L space (Fig. B-1).

The overall ice mass losses $L(M)=L'(M)+I_F(L,M)$ (28) consist of primary losses (21) and losses due to interactions (27). The relation I_F/M expresses how much of ice mass $I_F(L,M)$ is lost due to interaction with respect to primary losses $L'(M)=M$. The interaction potential $W_F(L,M)$ (29, integral of 27) represents the amount of work done by all environmental feedbacks and interactions of climate system and ice sheets. The relation W_F/W expresses how much work W_F is done due to interactions with respect to work done on melting of primary losses, (Table B-1, Fig. B-1).

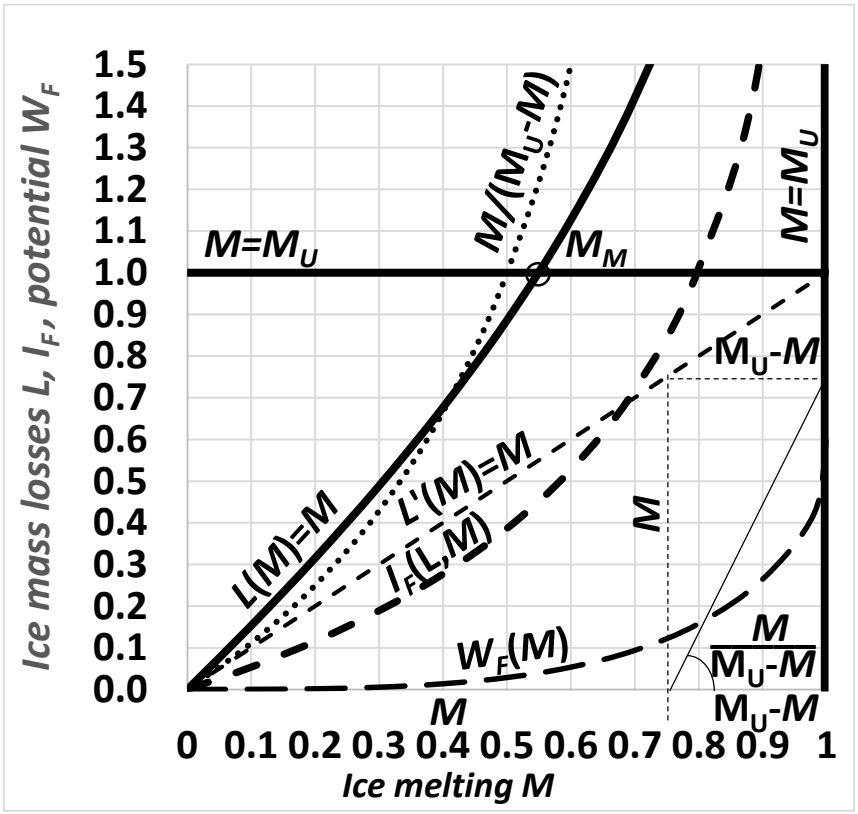

Figure B-1. Model of discrete ice melting in 10 steps