

The influence of a supraglacial debris cover on the mass balance, dynamics and climate change response of the Djankuat Glacier, Caucasus, Russian Federation



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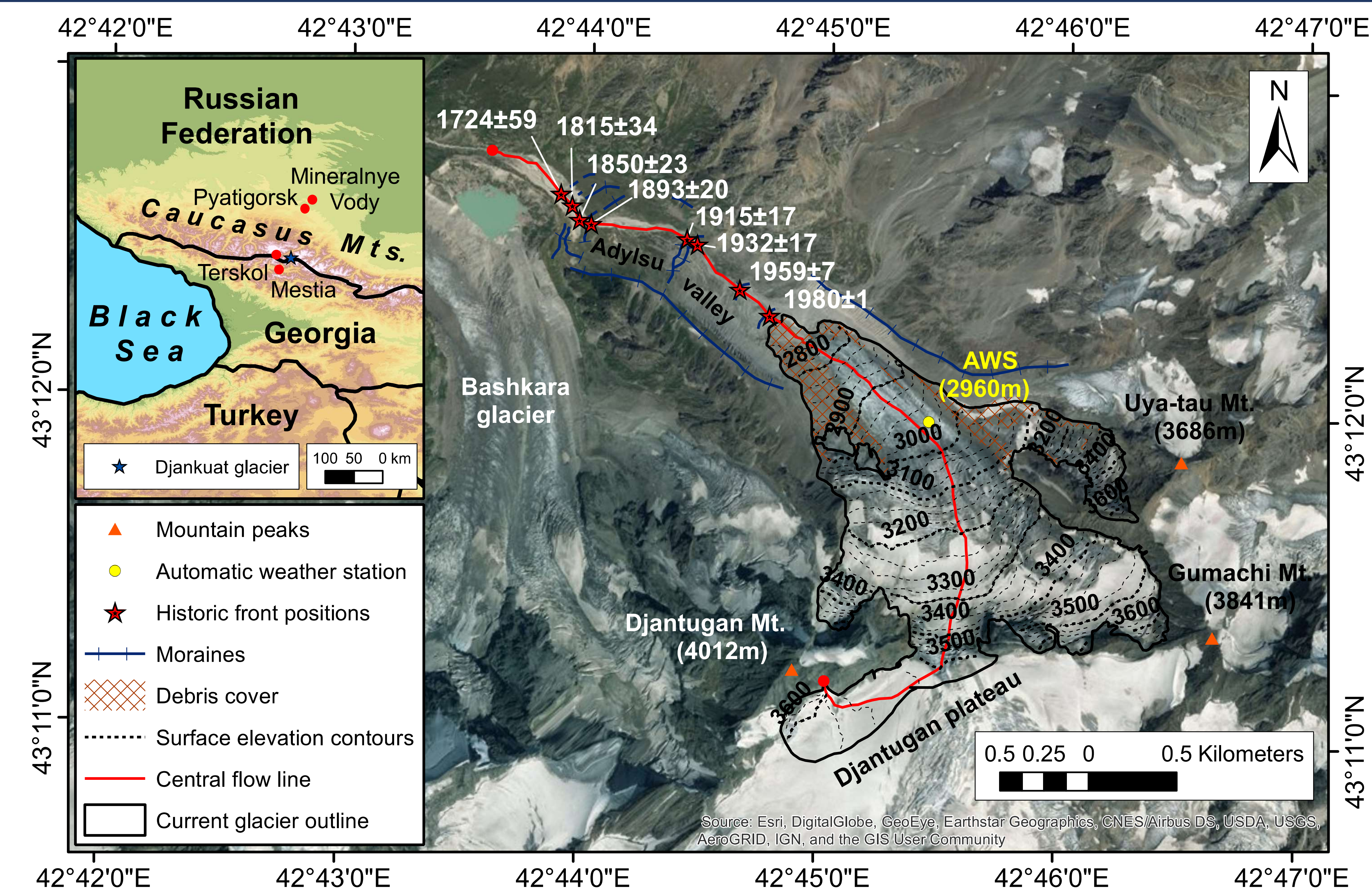
Introduction

- The Djankuat glacier, North Caucasus [43°12' N, 42°46' E]: WGMS reference glacier for the Caucasus area
- In 2010 AD: 13% of the glacier surface debris-covered, compared to total of 26.2% in the whole Caucasus
- Warming climate: debris coverage expected to increase (melt out, lower discharge, slope instability, etc.)

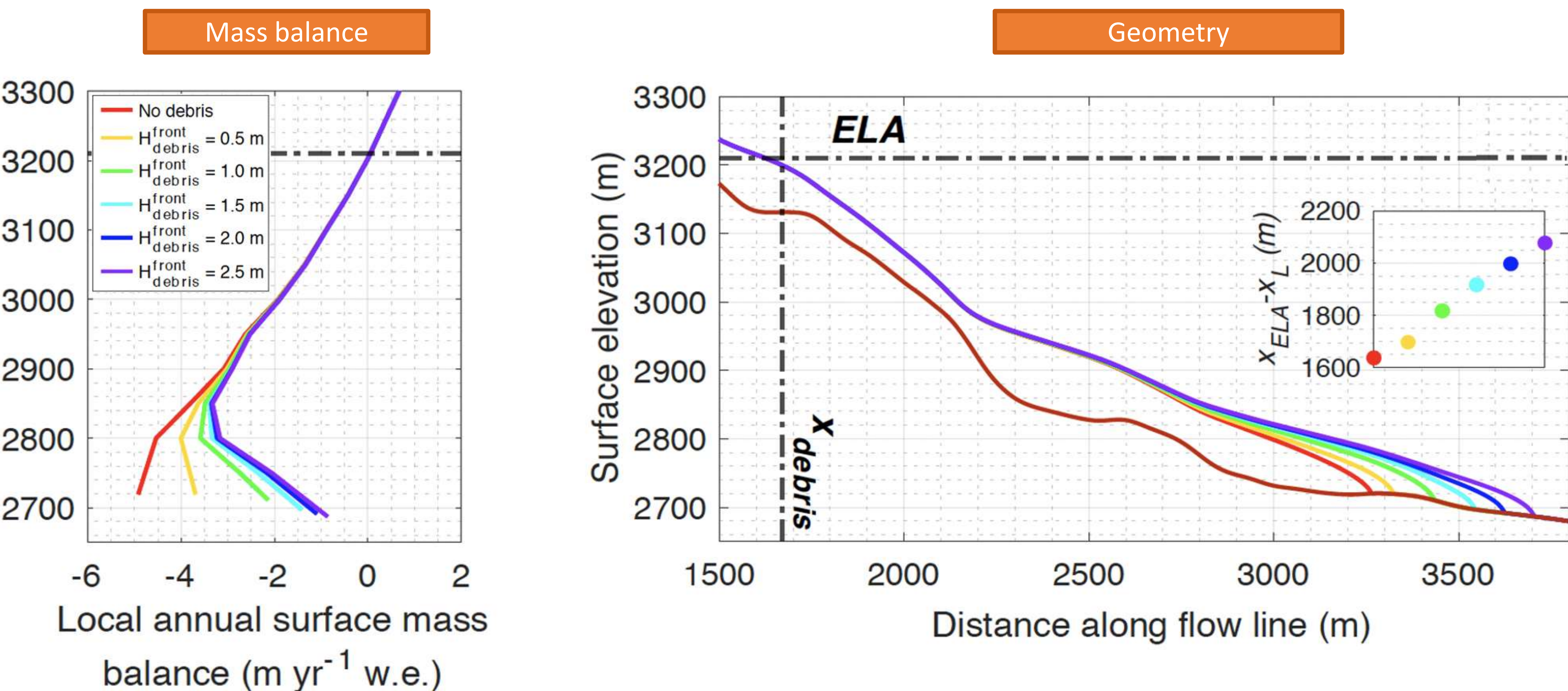
Methodology

- Use of 1D coupled ice dynamics-supraglacial debris cover model
- Debris input: mass flux surrounding terrain + meltout processes
- Effect on characteristics and behaviour of the Djankuat Glacier?

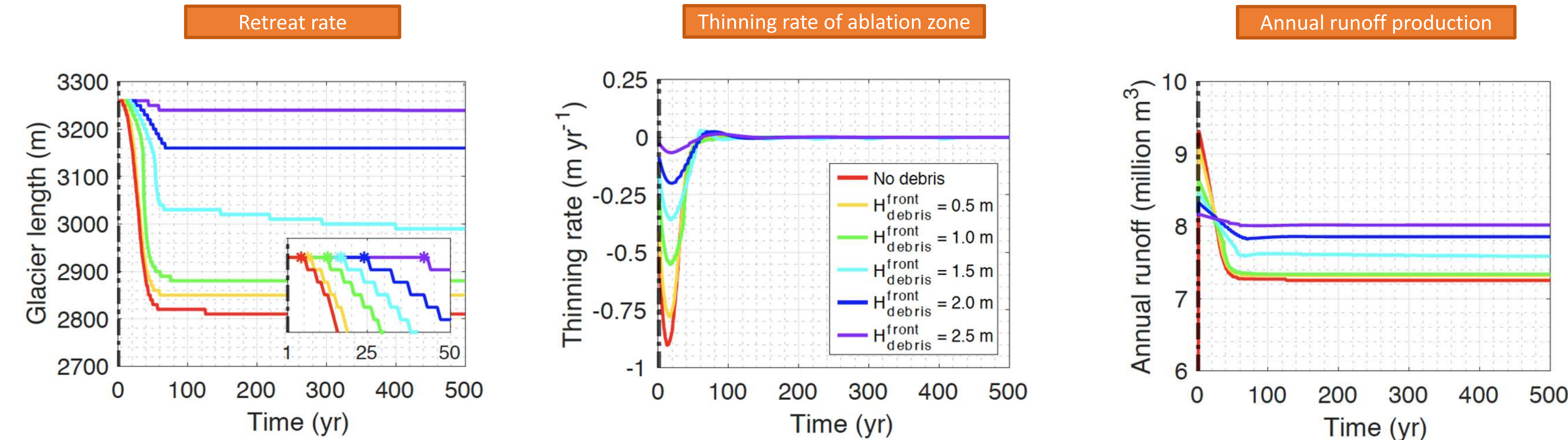
Study area



Main results – steady state characteristics



Main results – climate change response: reaction to ELA increase of 50 m compared to the 1967/68-2006/07 average



Some conclusions

- Thick debris: melt-reducing effect
- Formation of slower-flowing down-wasting tongue: relatively thinner but longer ablation zone
- Response to a climate change: ice mass loss dominantly comprises thinning rather than glacier retreat (longer response times)
- In an equal climatic setting the steady state debris-covered glacier produces higher annual runoff volumes than the clean ice glacier (less melt but higher ice volume)