

Modelling of Alpine Glaciers in the Earth System with ISSM

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(and more)

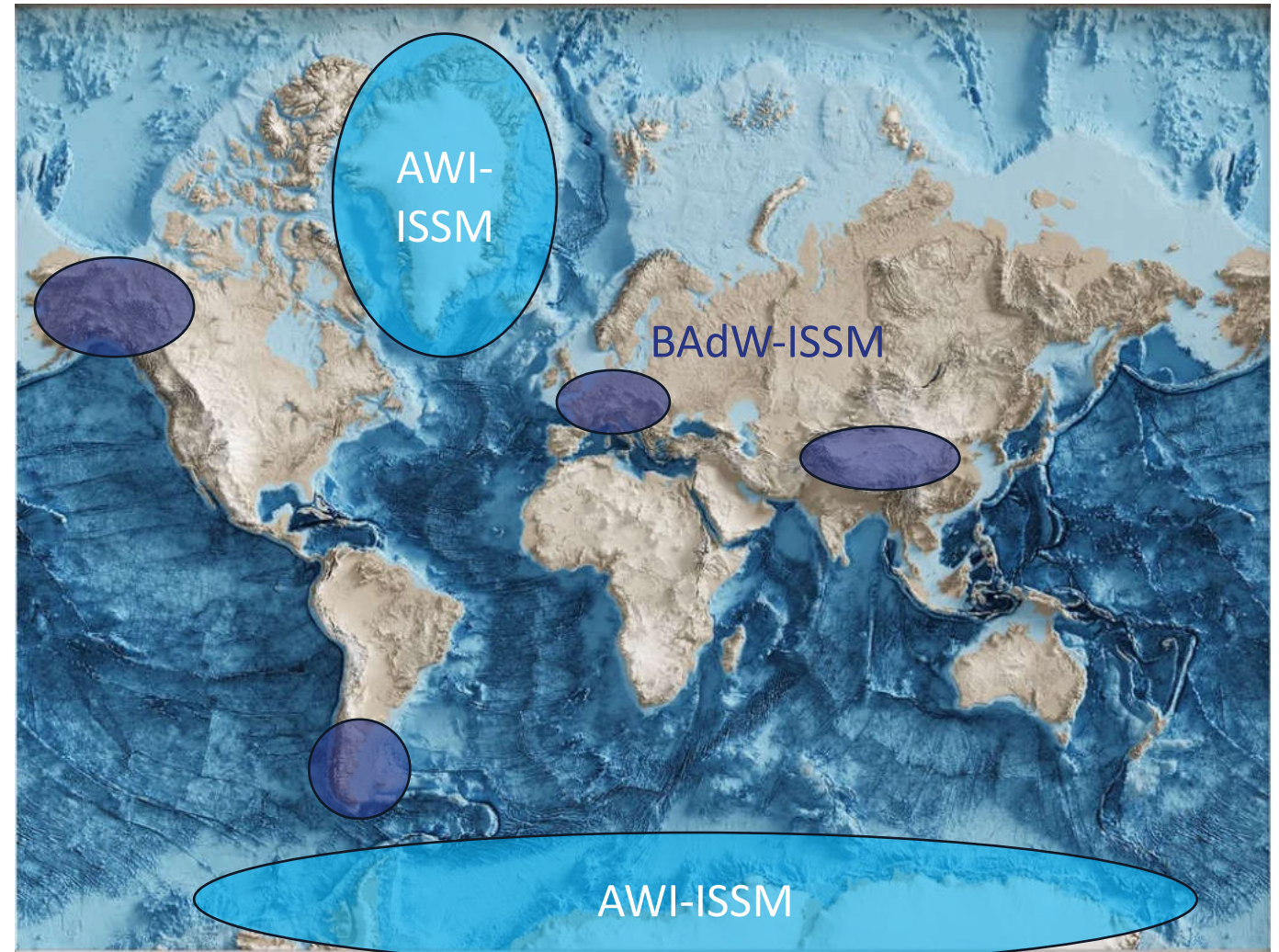


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- ISSM @AWI
 - polar ice sheets
- ISSM @BAdW
 - „GIC“
 - focus on the Alps
- Development of a so-called ha-ESM



➤ Concept of an ESM

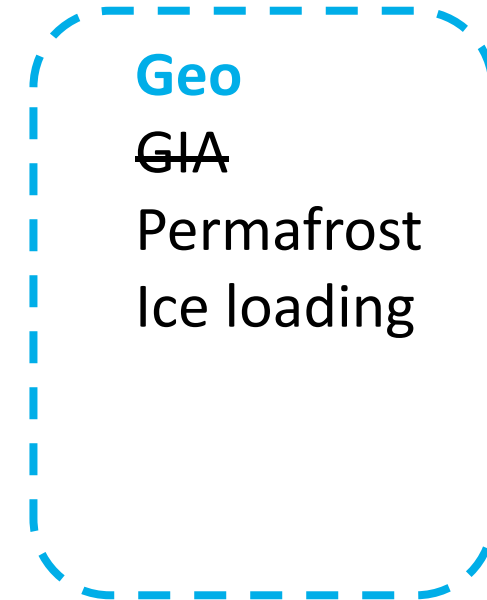
➤ Designed for small scale alpine regions

➤ preCICE coupler

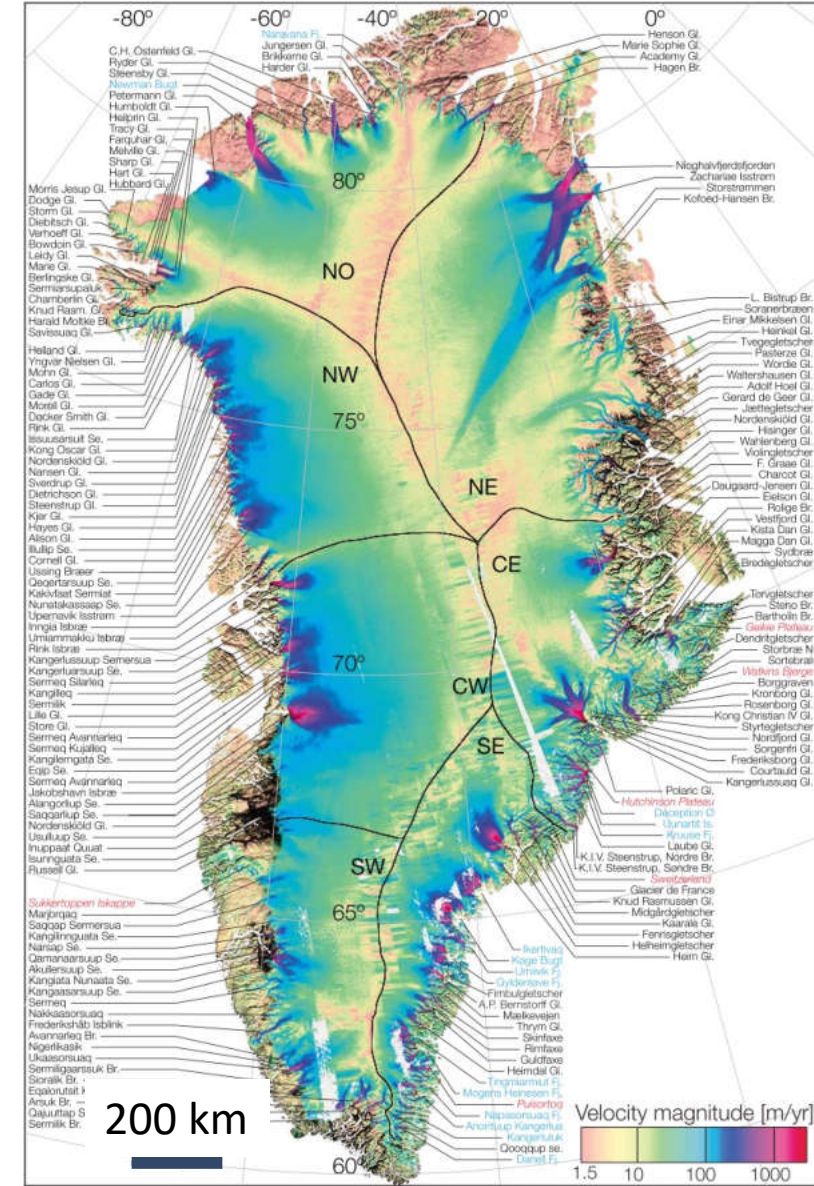
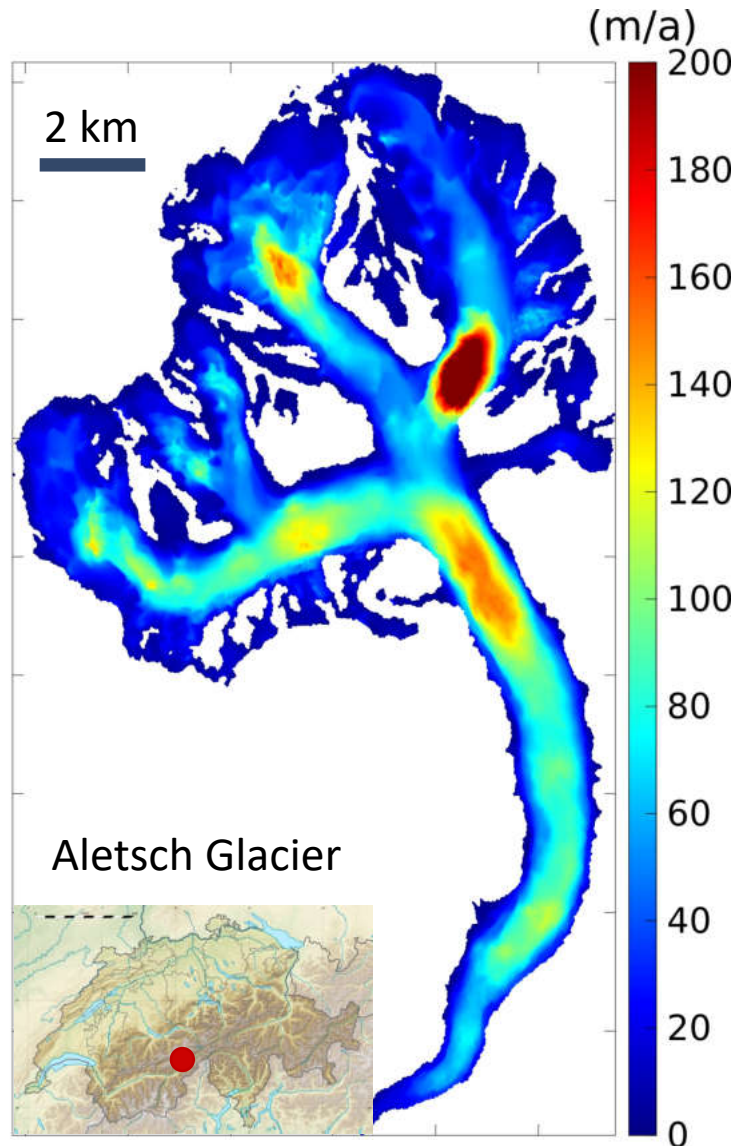
➤ “negotiated”



(not all for ha-ESM)



- Different spatial scales
- Grid resolution
~meters vs ~kilometers
- Commonly full-Stokes
(flexibility of ISSM to test
Approximations)

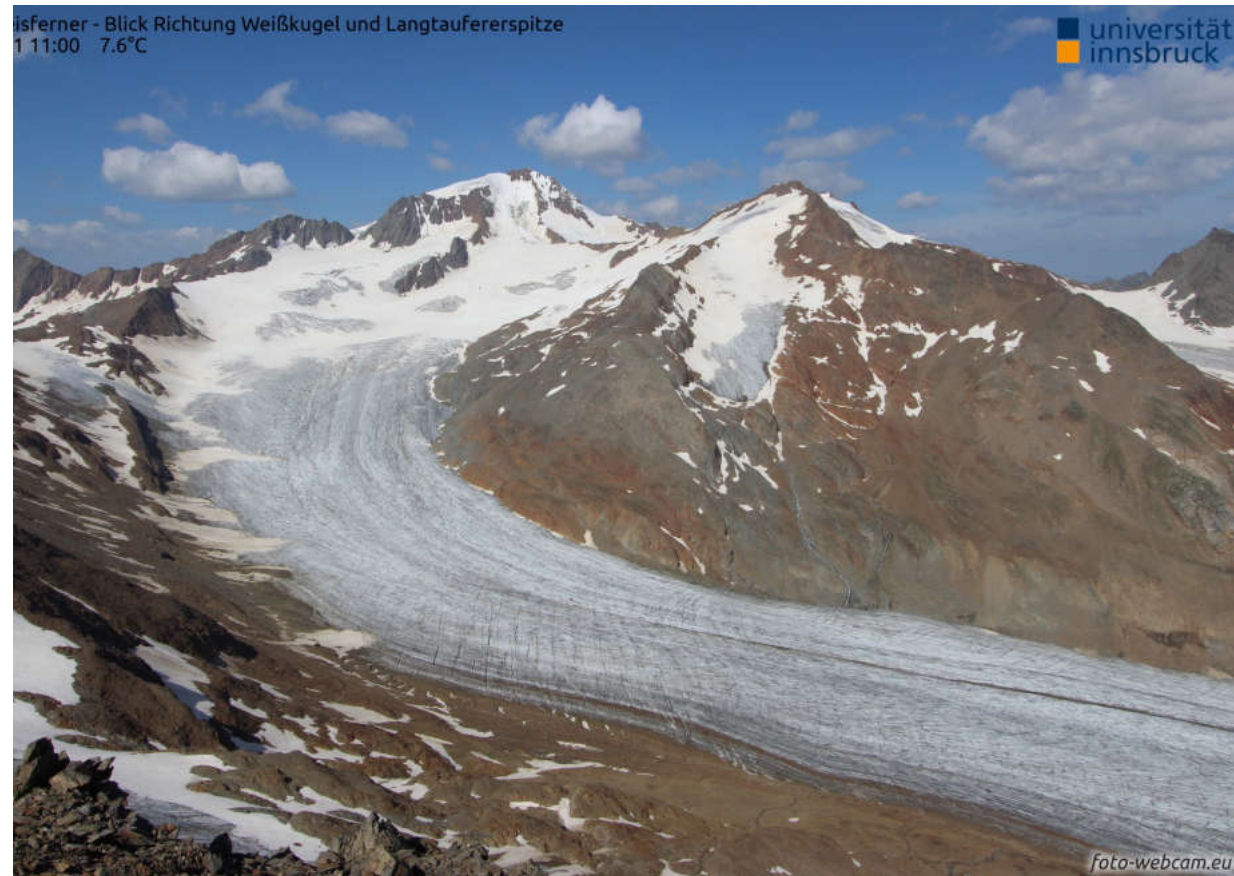


Rignot & Mouginot 2012

Clean-ice versus Debris-covered glacier

Clean-ice

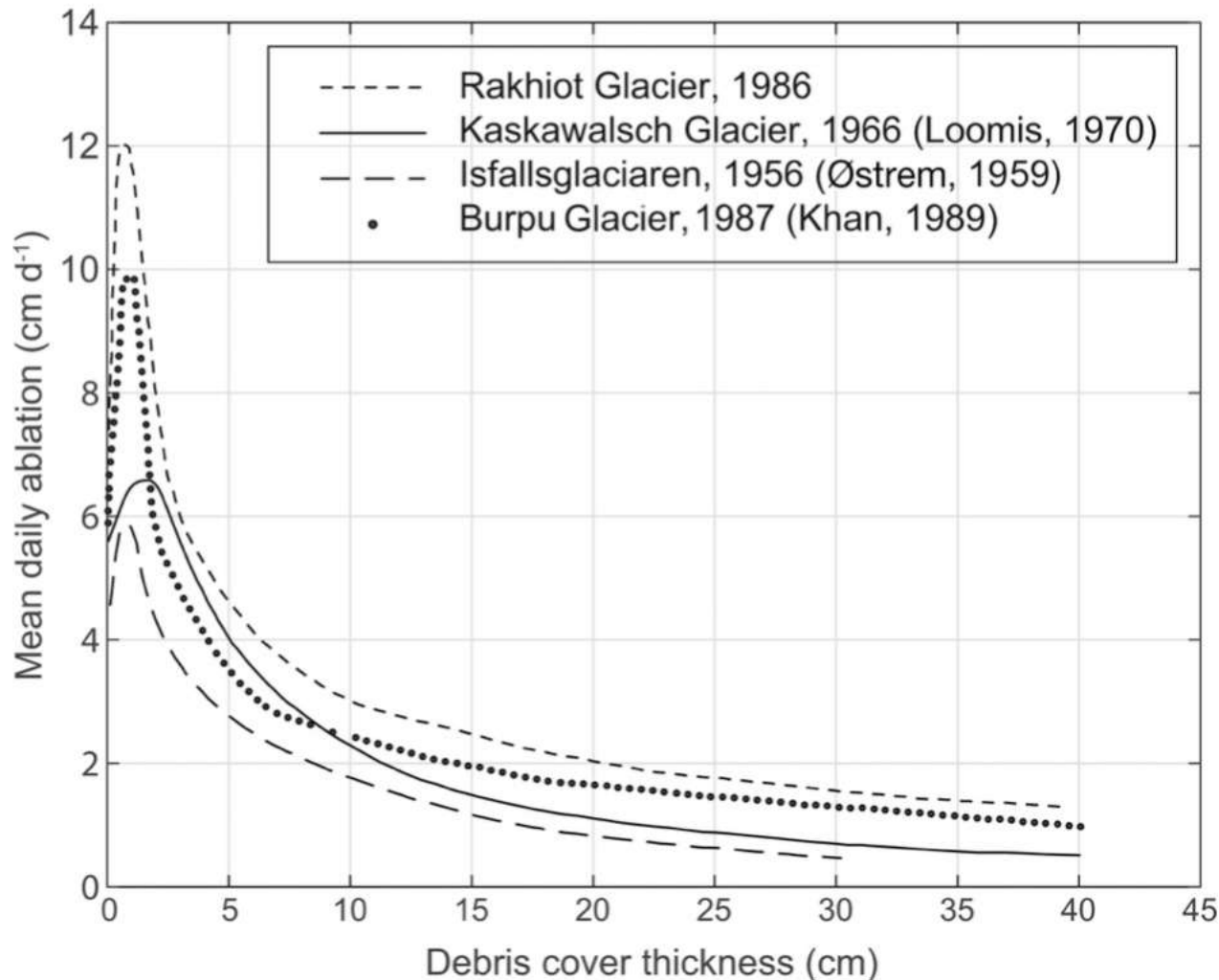
Debris-covered



Hintereisferner, Ötztal
(www.foto-webcam.eu)

Urdok, Karakorum

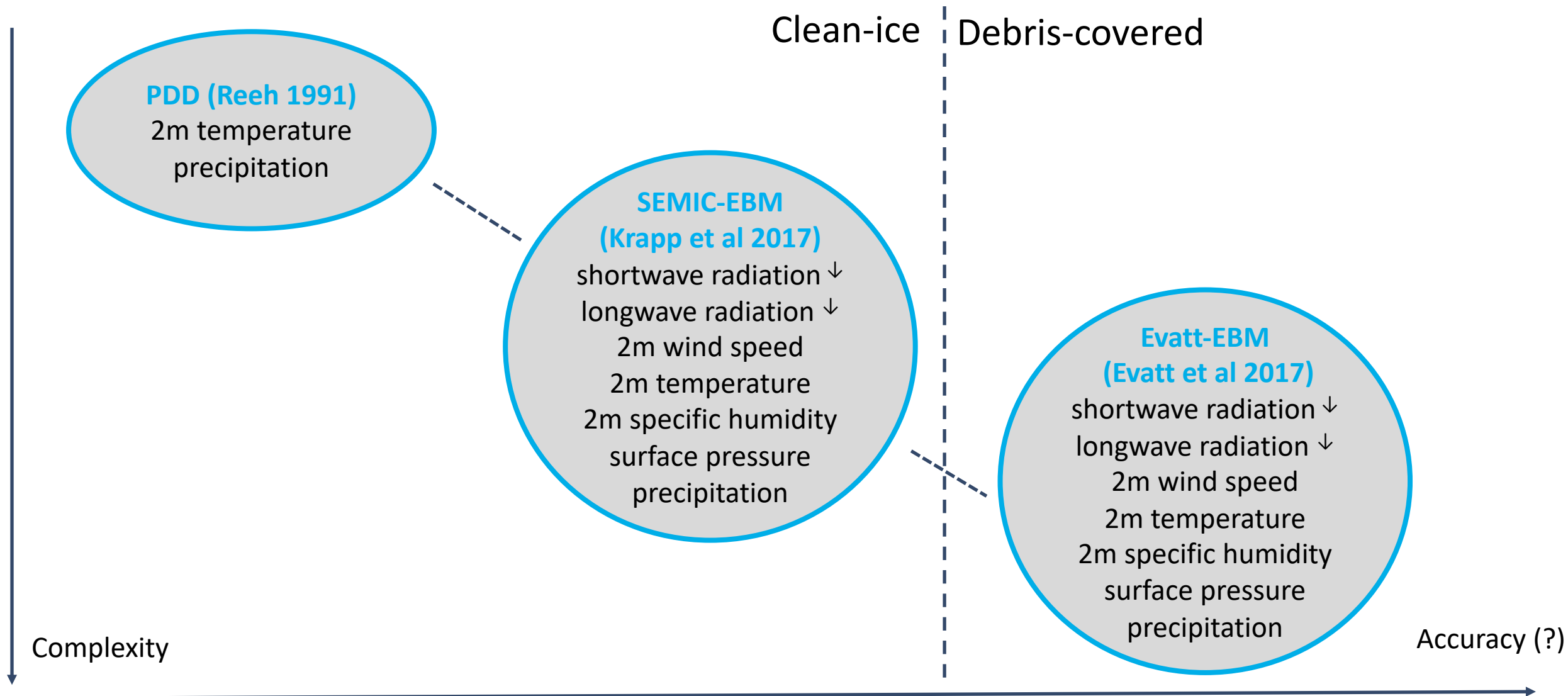
Østrem curve

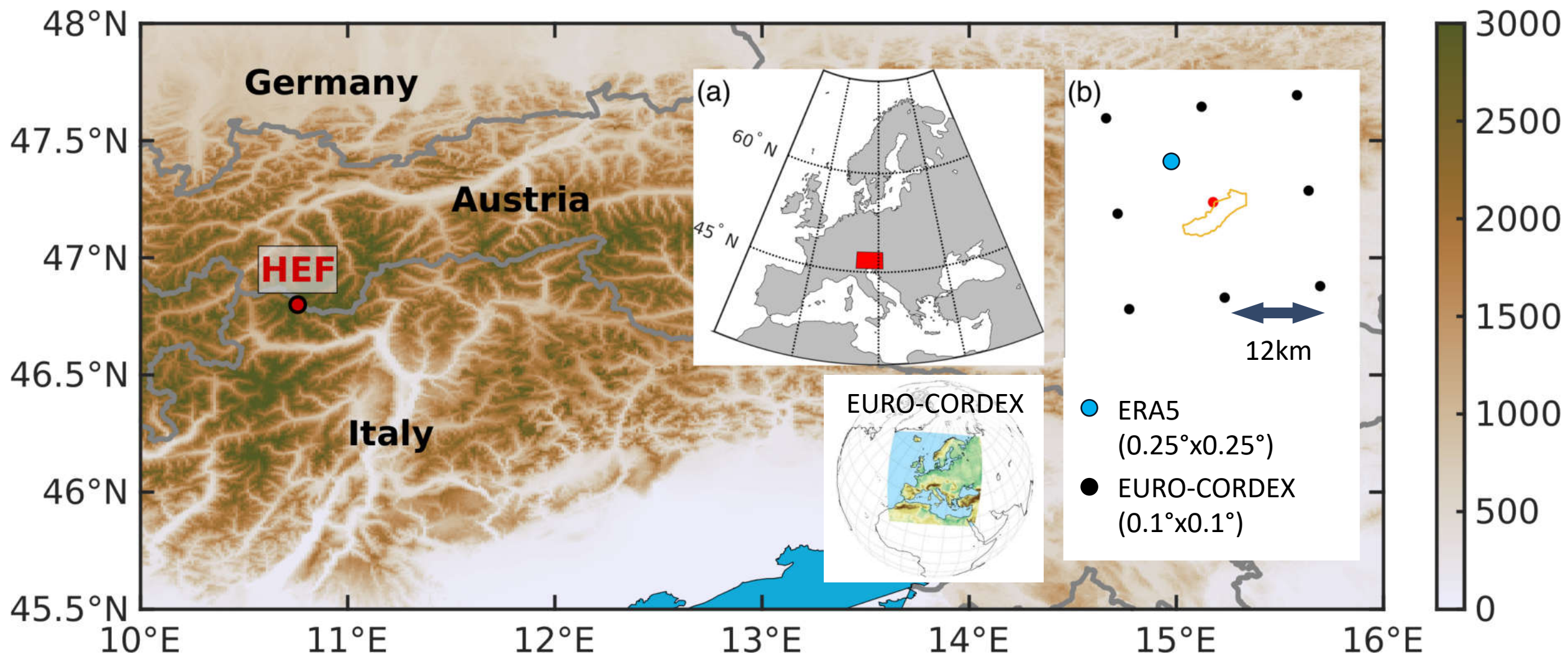


Relevant processes to explain the turning point (Evatt et al., 2017):

- ↑ different albedo
- ↑ decay of wind speed at ice/debris interface
 - reduction of evaporation
 - increase of melt
- ↓ insulating effect

The ice flow model needs a surface mass balance ...





A wide-angle photograph of a majestic mountain range covered in snow. The peaks are sharp and jagged, with patches of dark rock visible. The sky is a clear, deep blue. The foreground is a vast, flat expanse of snow, possibly a valley or a plain. The overall scene is serene and majestic.

Thank you!

Debris-covered glacier

