Brief Introduction to SeaRISE*

Sophie Nowicki & the SeaRISE participants

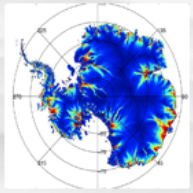
Additional information:
-"google SeaRISE": http://websrv.cs.umt.edu/isis/index.php/SeaRISE_Assessment
- Papers: Bindschadler et al. (2013), Nowicki et al. (2013a), Nowicki et al. (2013b)

*Sea-level Response to Ice Sheet Evolution

SeaRISE Goals

The Sea-level Response to Ice Sheet Evolution initiative is a NASA-led, international effort to investigate the **sensitivity** of ice sheets & inform the 5th IPCC of the **potential contribution** of ice sheets to sea level over the next 200 years.

http://websrv.cs.umt.edu/isis/index.php/SeaRISE_Assessment



page | discussion | view source

SeaRISE Assessment

navigation
- Main Page
- seaRISE
- Data
- Tutorial I: 2009 Portland, OR
- Tutorial II: 2011 Beijing, China
- Software
- Documentation
- Adjoint CISM
- Recent changes

search

Go Search

toolbox
- What links here

Contents [hide]

What is SeaRISE?

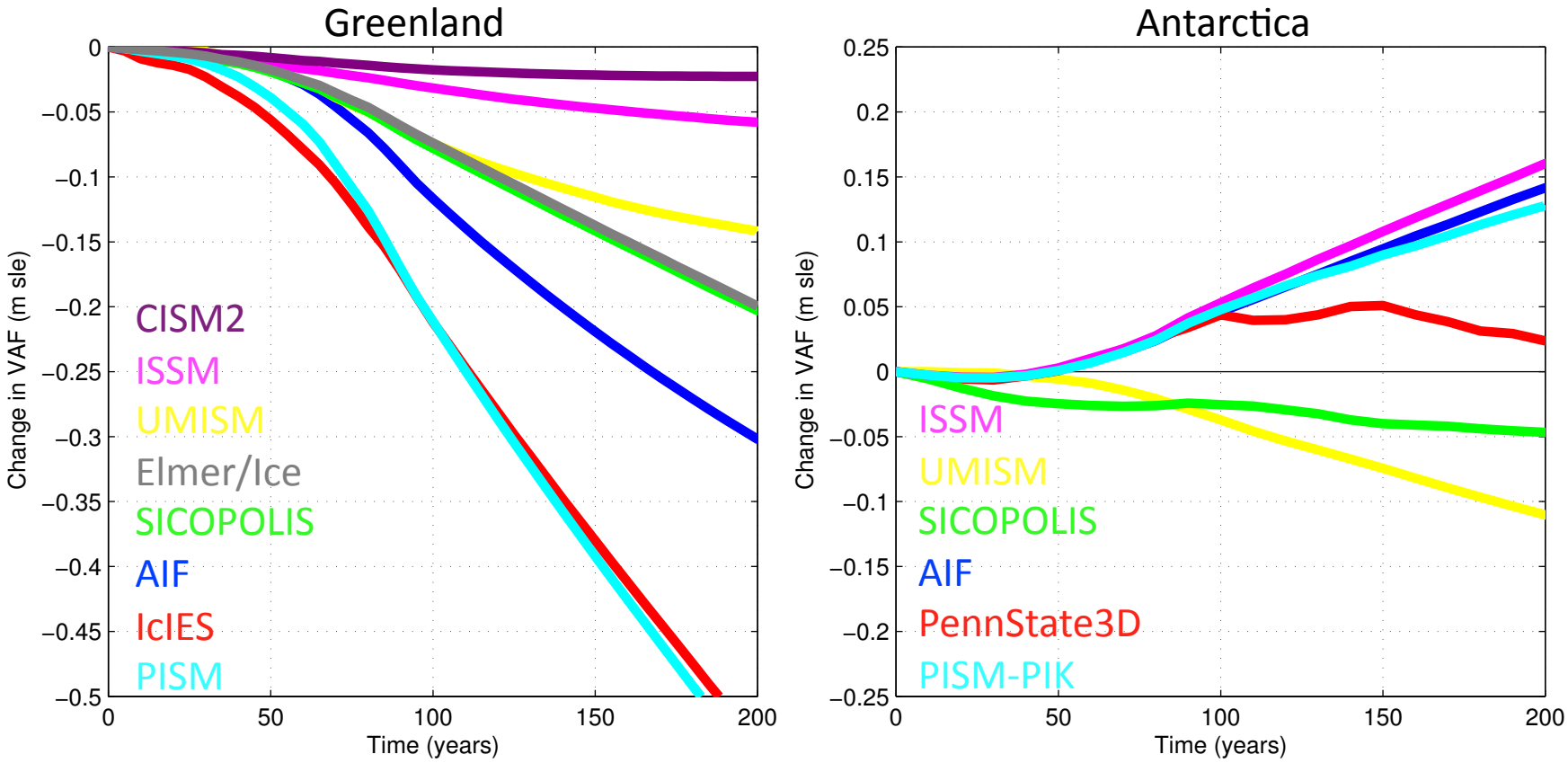
Sea-level Response to Ice Sheet Evolution (SeaRISE) is a community organized effort to estimate the upper bound of ice sheet contributions to sea level in the next 100--200 years. SeaRISE objectives include

- developing a set of common input data. These efforts are available from the Data portion of this wiki.
- designing and executing a set of numerical experiments employing a wide range ice sheet models. A notional list can be found in the SeaRISE White Paper; details of actual agreed-to cases are found in Experiments.
- refining details of rapidly responding areas in particular experiments with ice stream/ice-shelf or ice-shelf/ocean regional models

Participating models will compare output to determine both the contribution to sea level, as well as associated uncertainties.

14 July, 2009: seaRISE is pleased to announce that NASA is now supporting core data assembly and simulation efforts.

SeaRISE Atmospheric Sensitivity Experiment



Is the spread in ice sheet response due to:

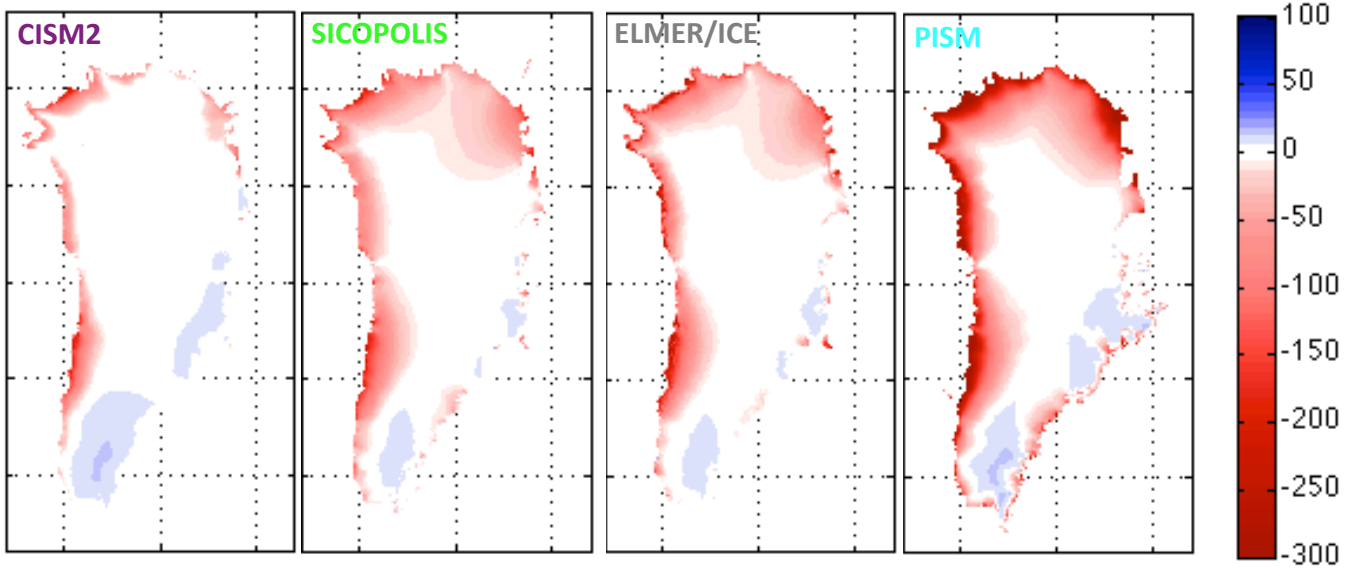
Initialization / Spin-up?

Ice sheet model physics?

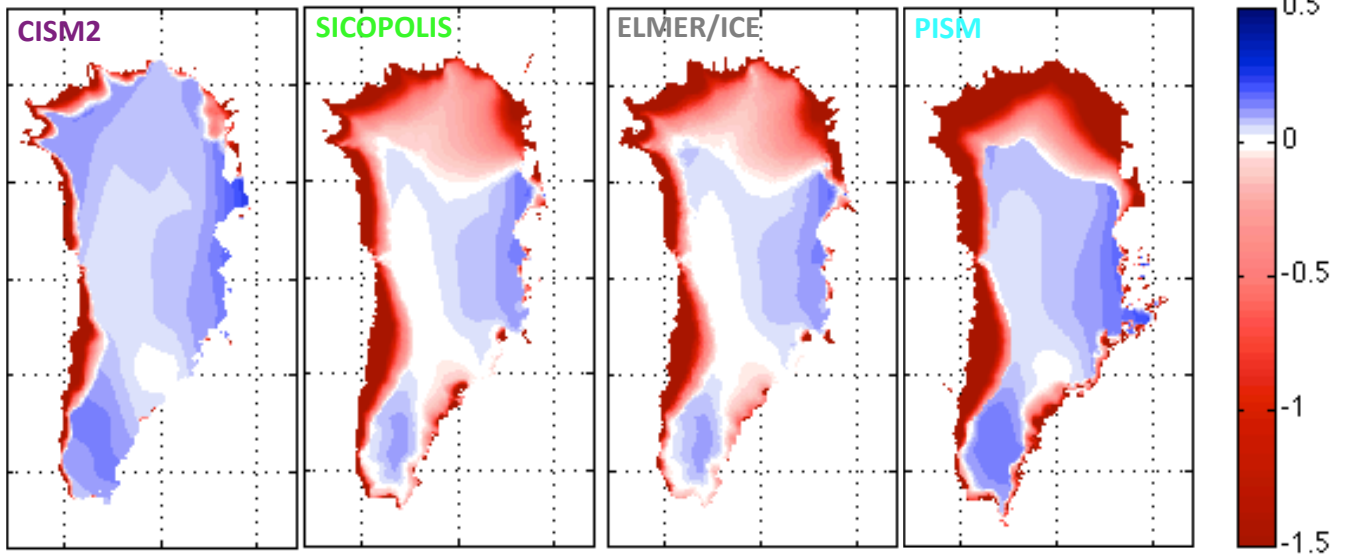
Surface forcings and feedbacks?

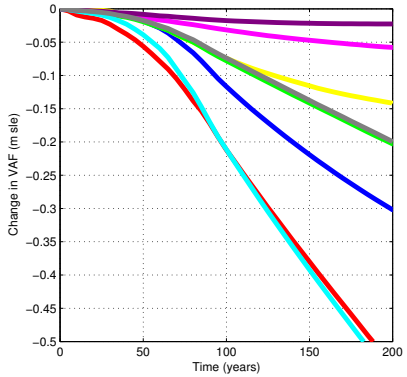
How should SMB be computed?

Thickness change (m) @ t = 100 yr



SMB anomaly (m/yr) @ t = 100 yr





SMB = Prec – Abla

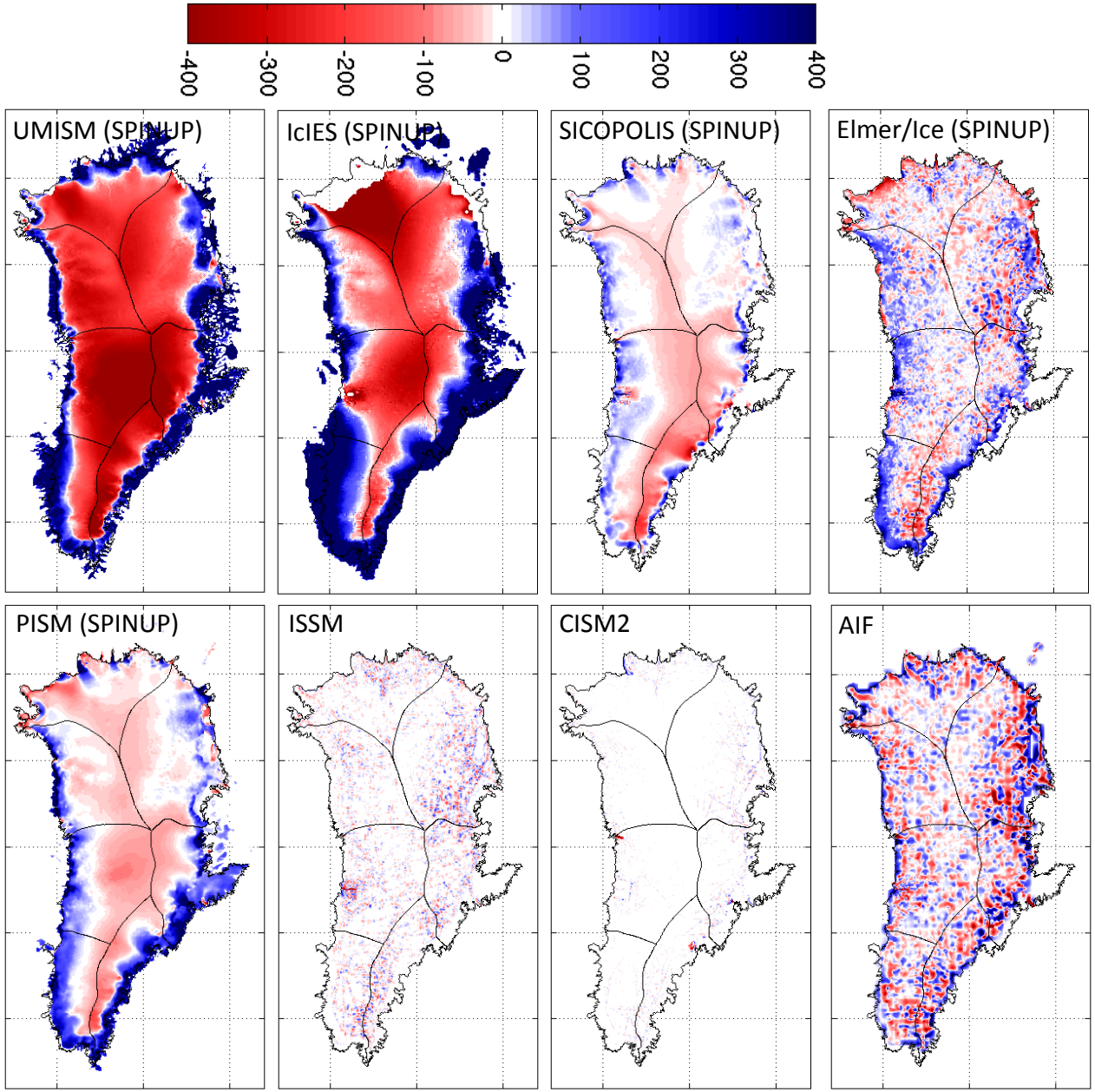
CISM2 does not have PDD scheme

SICOPOLIS (SIA) & Elmer/Ice (FS) have same PDD scheme

PISM PDD scheme result in largest ablation, hence ice loss

Which PDD scheme should be used?

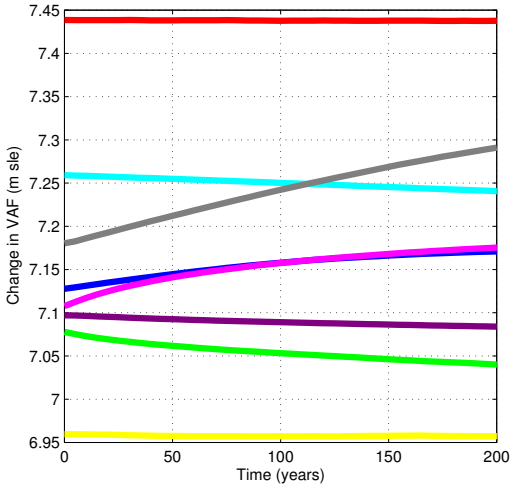
Modeled - Observed Surface Elevation (m)



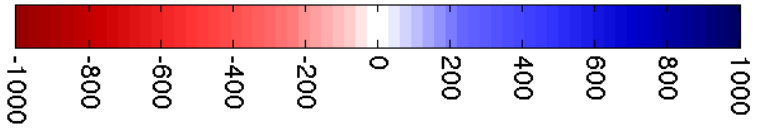
Present day VAF (m sle)

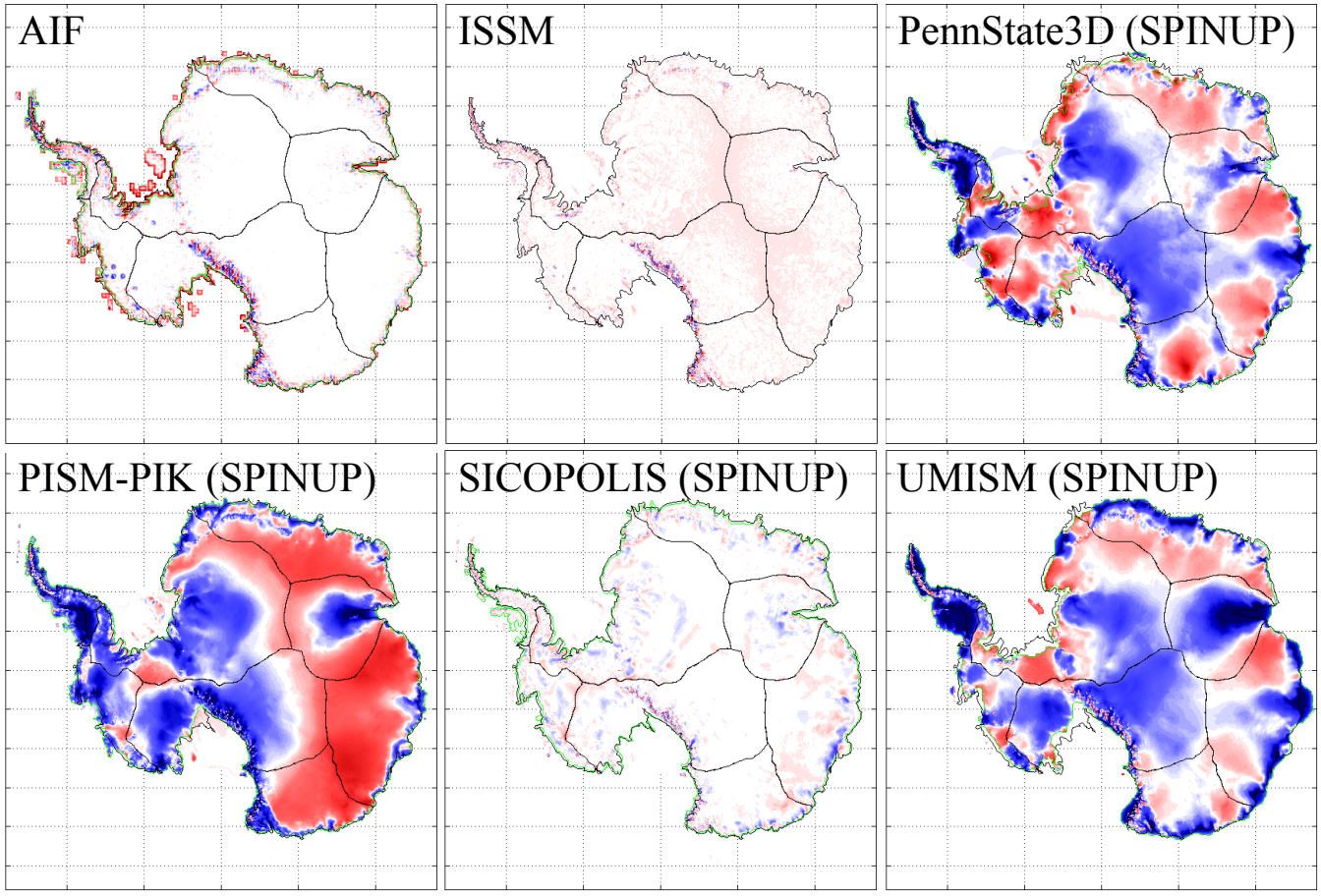
UMISM	6.95
IcIES	7.55
SICOPOLIS	7.07
Elmer/Ice	7.18
PISM	7.25
ISSM	7.10
CISM2	7.09
AIF	7.12

Control Simulation



Modeled - Observed Surface Elevation (m)

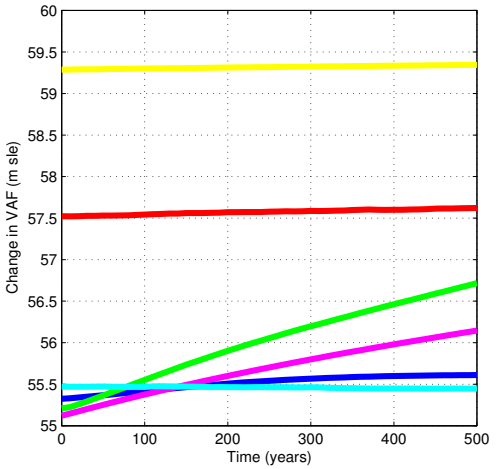




Present day VAF (m sle)

AIF	55.32
ISSM	55.12
PennState3D	57.52
PISM-PIK	55.47
SICOPOLIS	55.21
UMISM	59.28

Control Simulation



Thank you to:

- Tom Wagner (NASA HQ) for funding
- Everyone that contributed in building SeaRISE (from sharing data to ideas)
- Participating ice sheet models:
  - AIF
  - CISM2
  - Elmer/Ice
  - IcIES
  - ISSM
  - PennState2D
  - PennState3D
  - PISM
  - PISM-PIK
  - SICOPOLIS
  - UMISM

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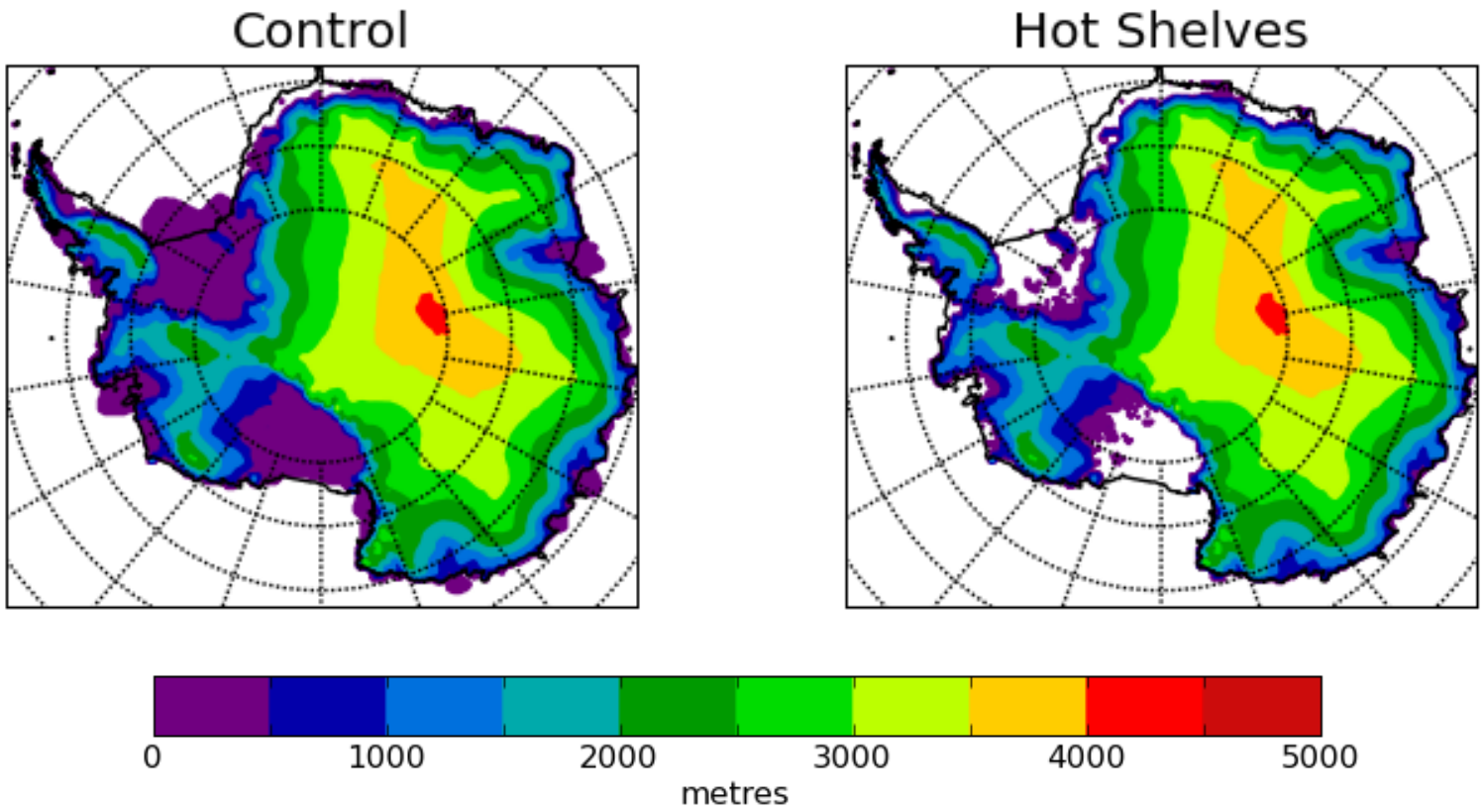
“Hot Shelves”

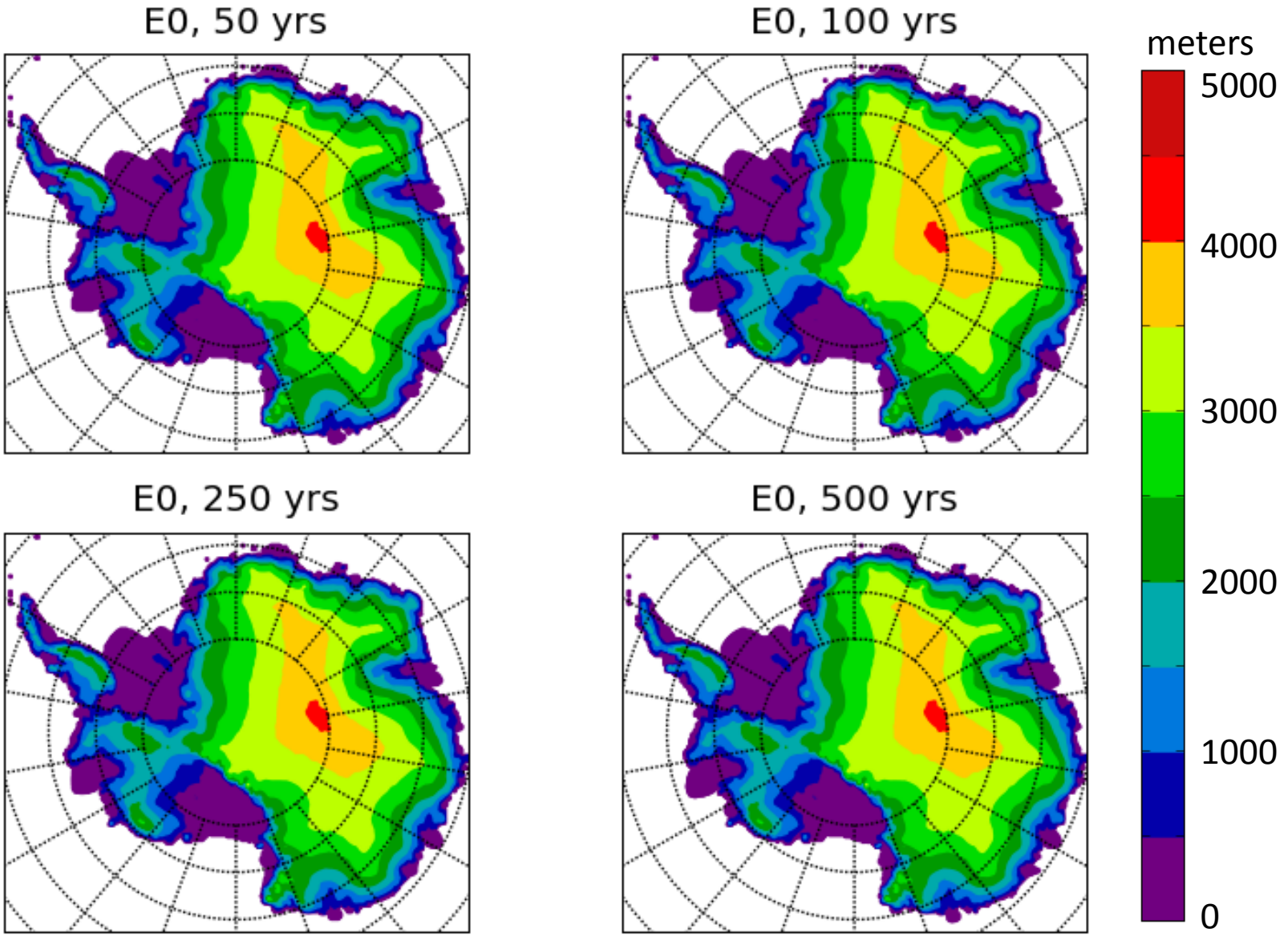
(remove all floating ice instantly)

Initial upper surface elevation

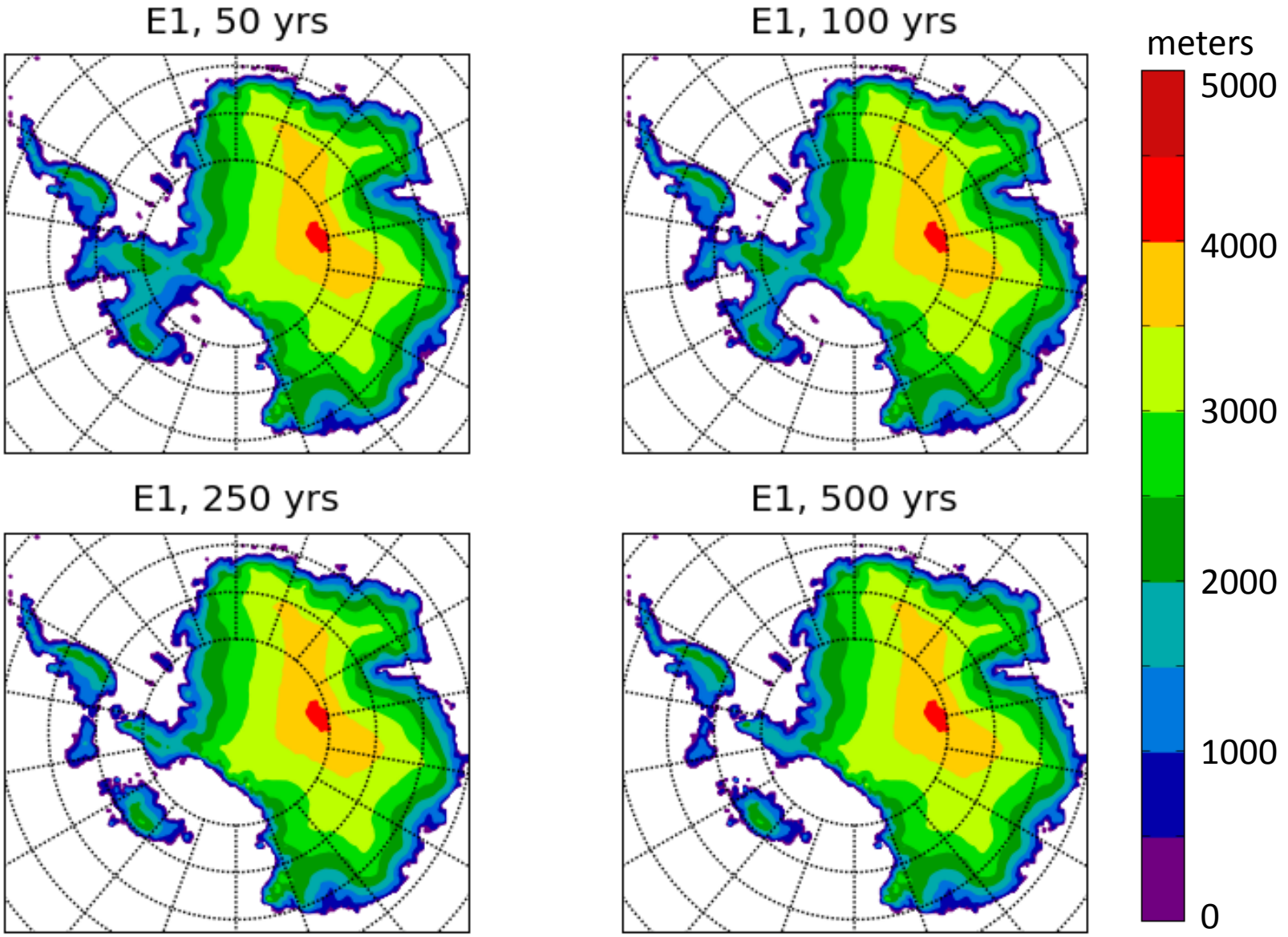


Model Simulations from Penn State University (David Pollard)

Upper surface elevation: control run

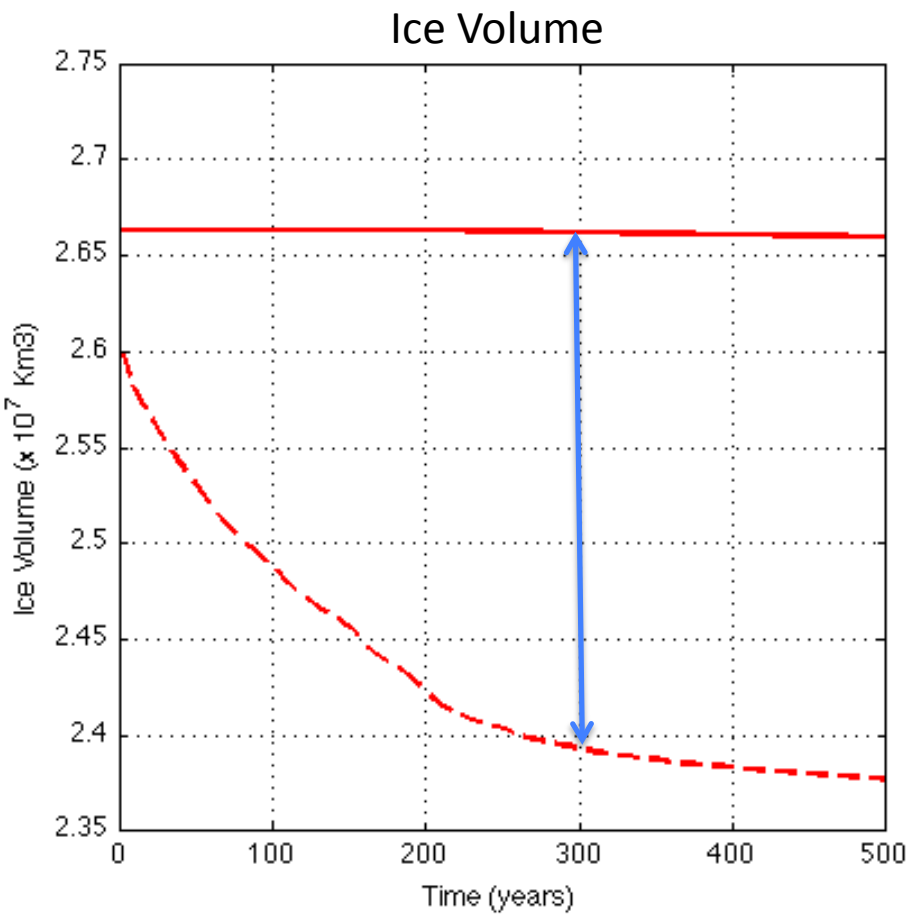


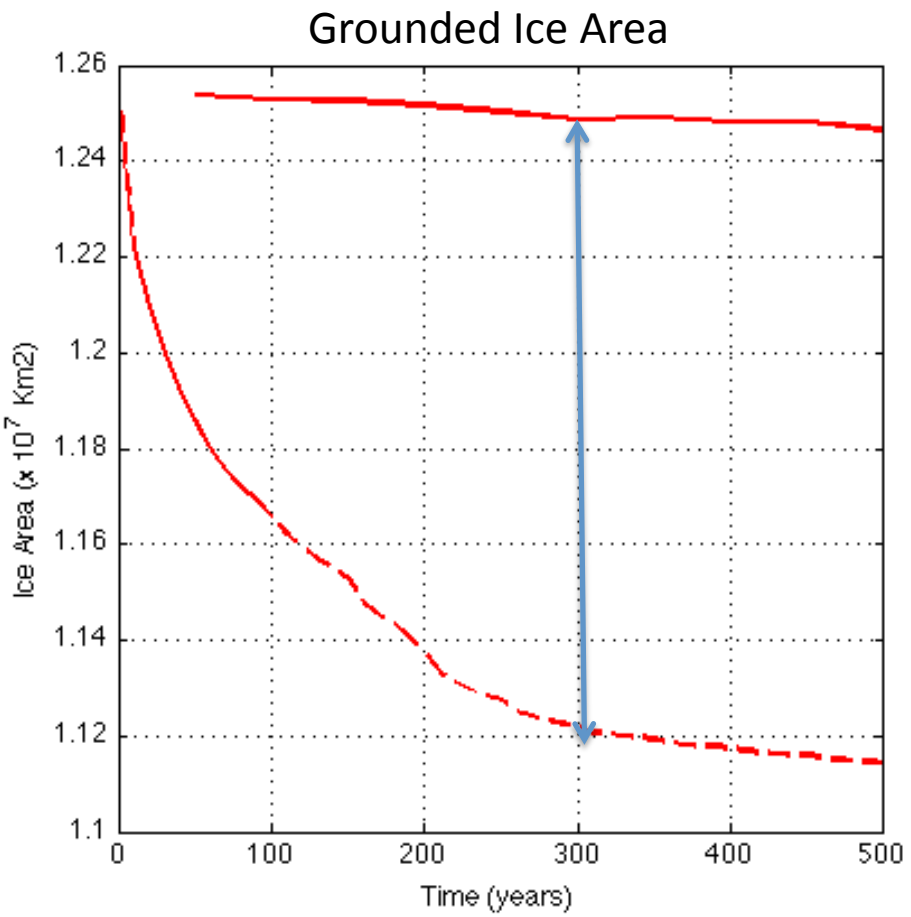
Upper surface elevation: Hot Shelves



Variation in ice volume and area

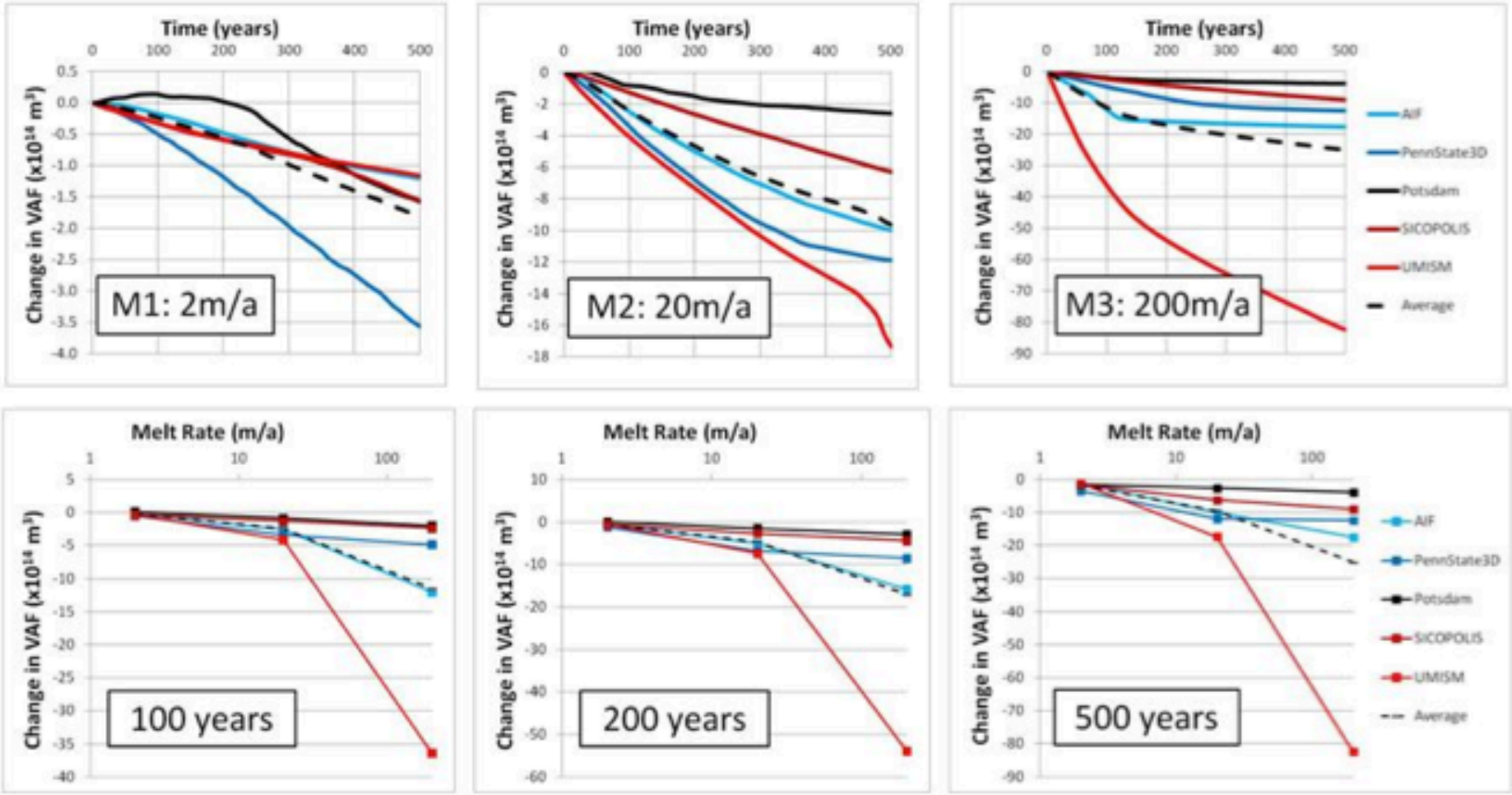
Control run Hot Shelves





Aim: difference between the experiments and control run

Sensitivity to melt rates



Thickness change from the M2 experiment (20m/yr after 100yr)