

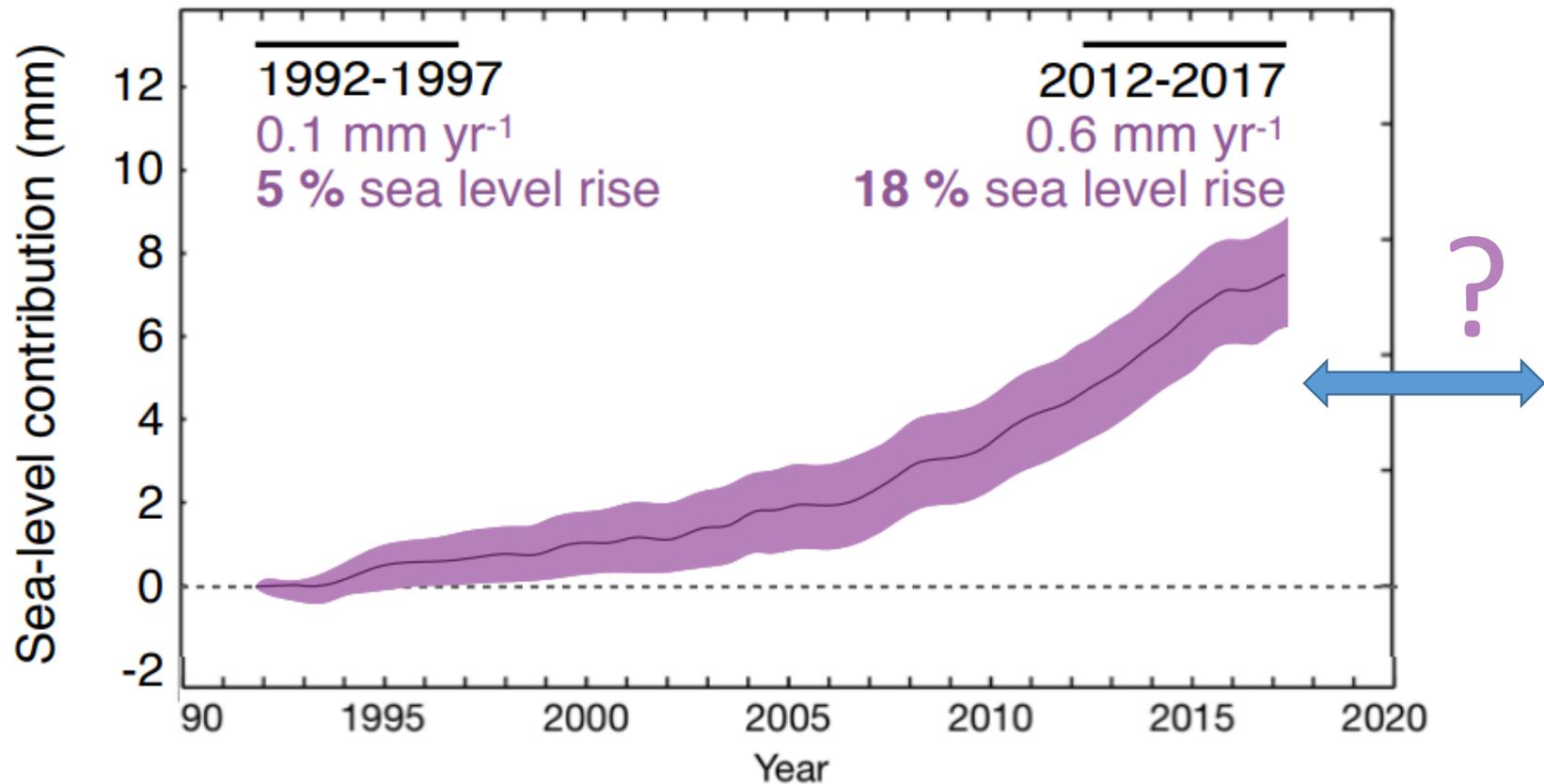
*Added value of a regional climate model
(MAR) for simulating the current surface
mass balance of the Antarctic ice sheet
compared to a general circulation model
(ACCESS1.3)*

C. Kittel

Antarctic climate symposium (10/05/2019)



Introduction



Projet IMBIE (Shepherd et al., 2018, *Nature*)

Introduction

- General circulation model (GCM)
 - Climate projections
 - Inputs for ice sheet models for the next IPCC report

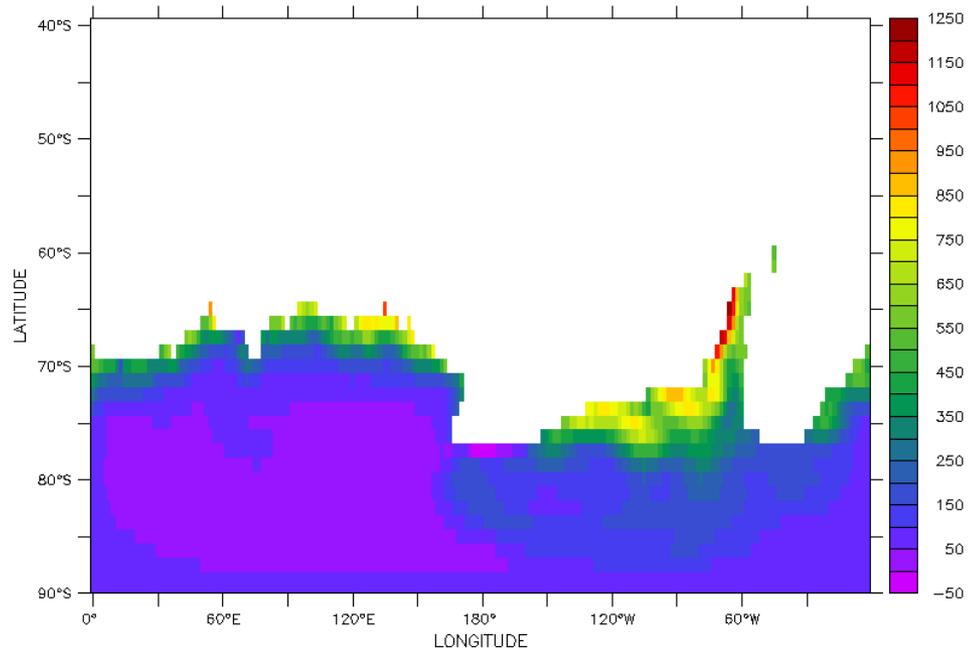
- BUT
 - Low resolution
 - Poor representation of polar climate specificities

Are we using the right tool for predicting the Antarctic surface climate?

Methods

- Comparing the SMB modelled by a RCM and a GCM
 - ACCESS1.3
 - 1.25°x1.25° resolution
 - Does not directly compute the SMB
 - $SMB \approx SF + RF - SU$

AC3 mean SMB (1980-2005)
(kg/m²yr)



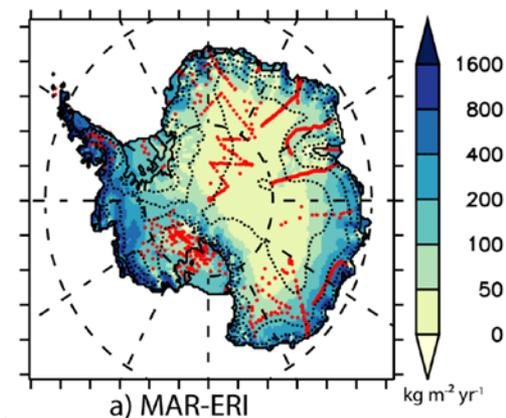
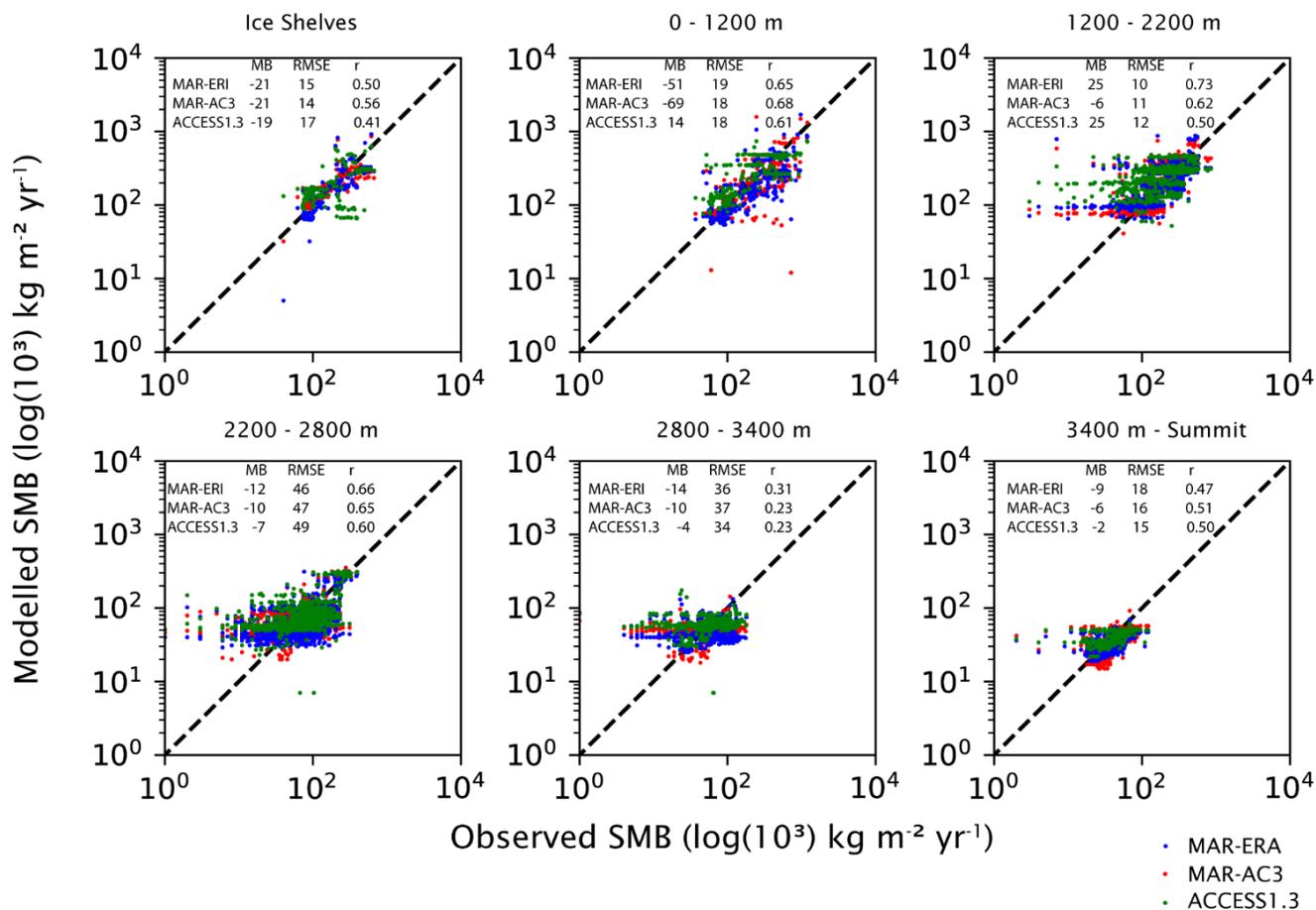
Methods

- Comparing the SMB modelled by a RCM and a GCM
 - MAR
 - Polar-adapted physics
 - Correctly represents the Antarctic SMB (dz/dt)
 - 35km x 35km
 - Forced by the ERA-Interim reanalysis and by ACCESS1.3

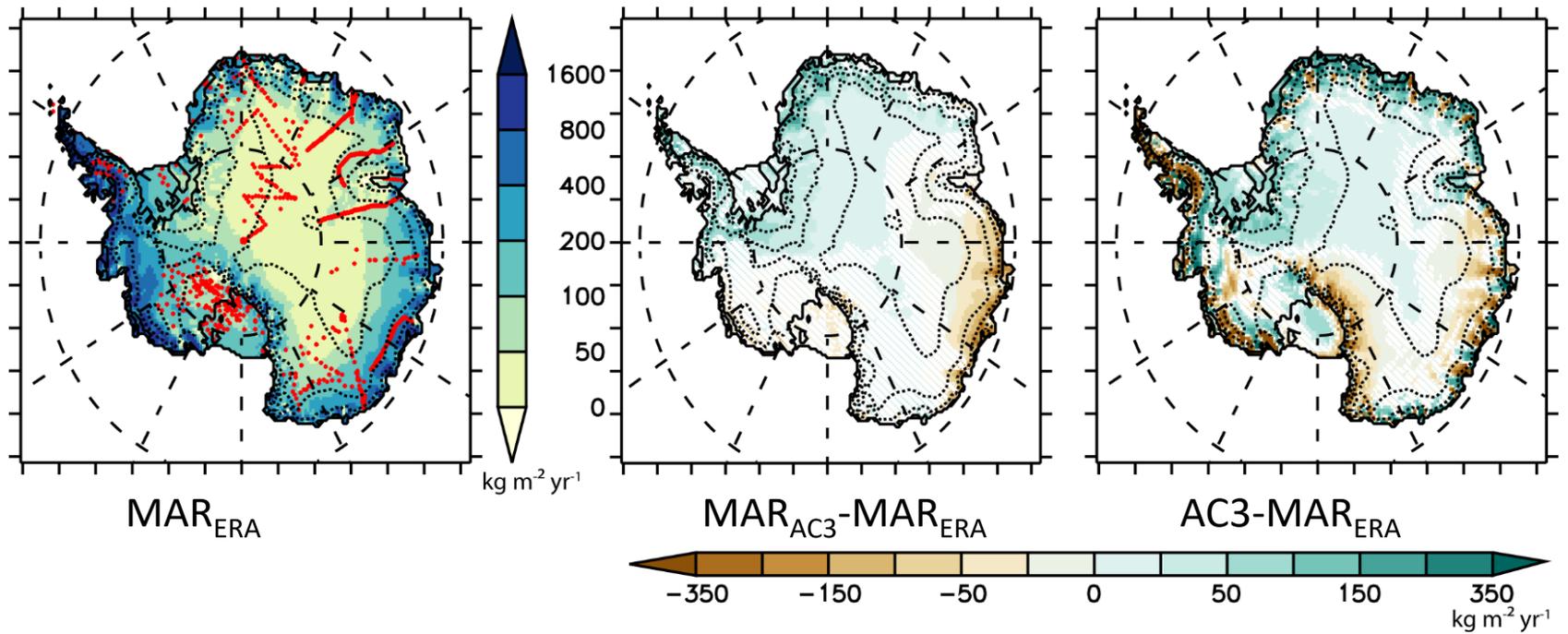
Integrated values

Gt/yr	SMB	SF	RF	SU	ME
MAR-ERI	2557	2664	33	140	35
MAR-AC3	2635	2717	41	123	41
ACCESS1.3	2507	2714	21	228	-

Comparison with SMB Observations



Spatial comparison



Discussion

- But what about the representation of the summer climate?

	°C	Mean Bias	RMSE	r
MAR-ERI		-1.6	2.2	0.99
MAR-AC3		-1.2	2.6	0.99
ACCESS1.3		-2.6	4.1	0.97

Conclusion

- Using a RCM seems to be not required to represent the **current** mean SMB of the Antarctic Ice Sheet
- Better representation of the summer climate by MAR
 - Added-value of a RCM in a warmer climate?