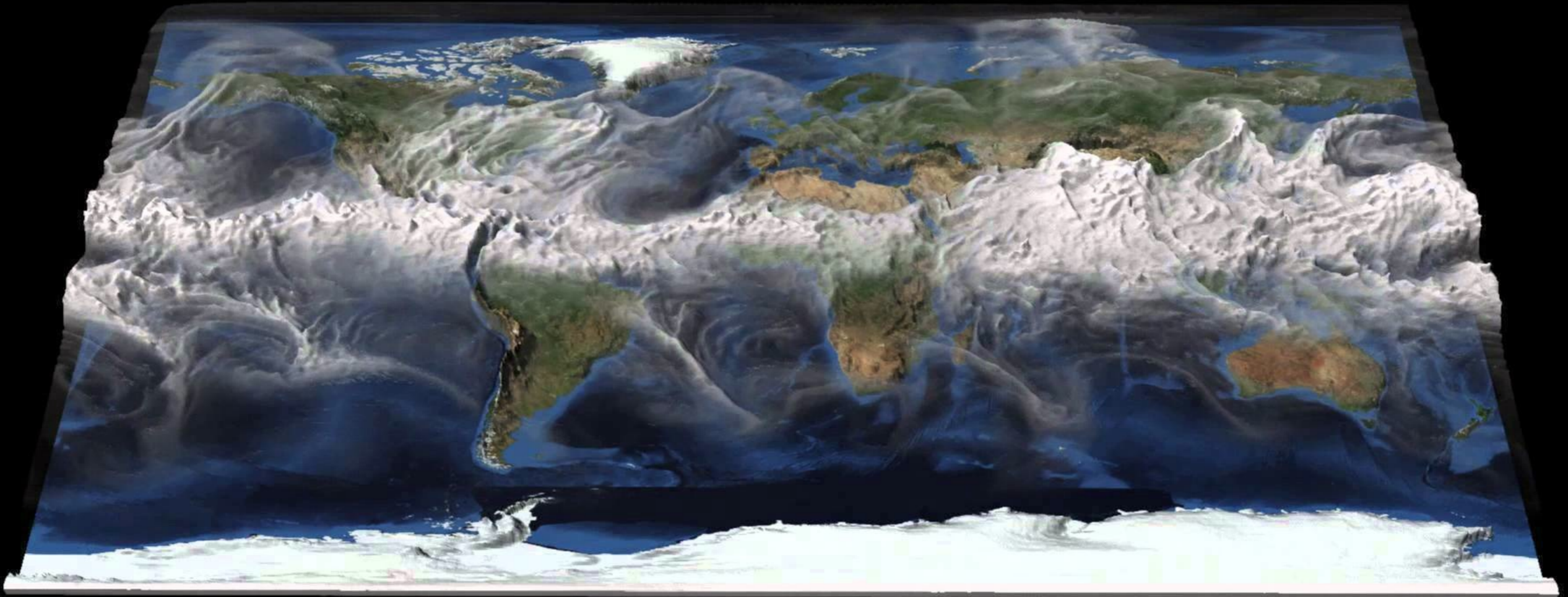


**Ben Sanderson**

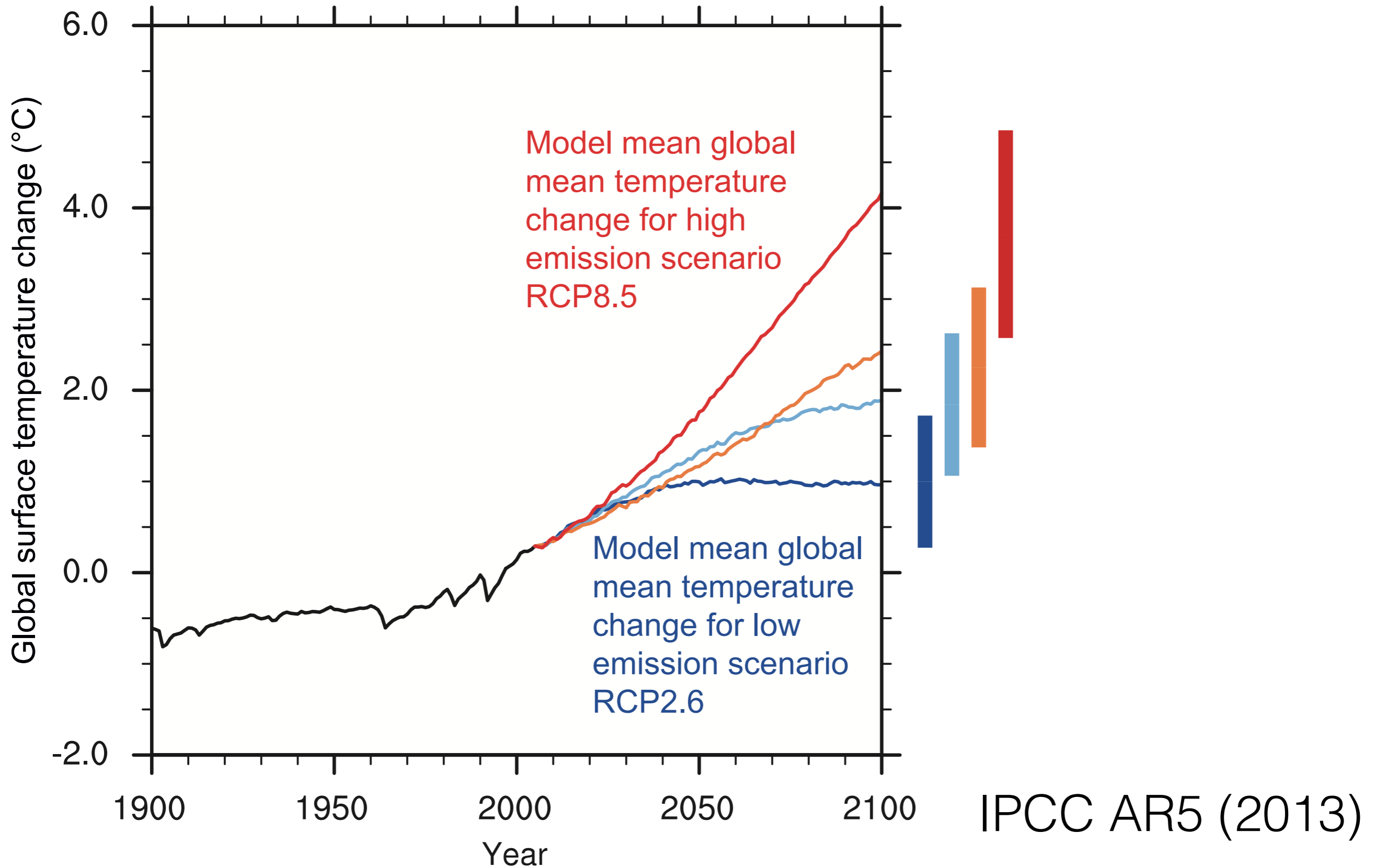
Uncertainty in Climate Modeling

What assumptions are we making?

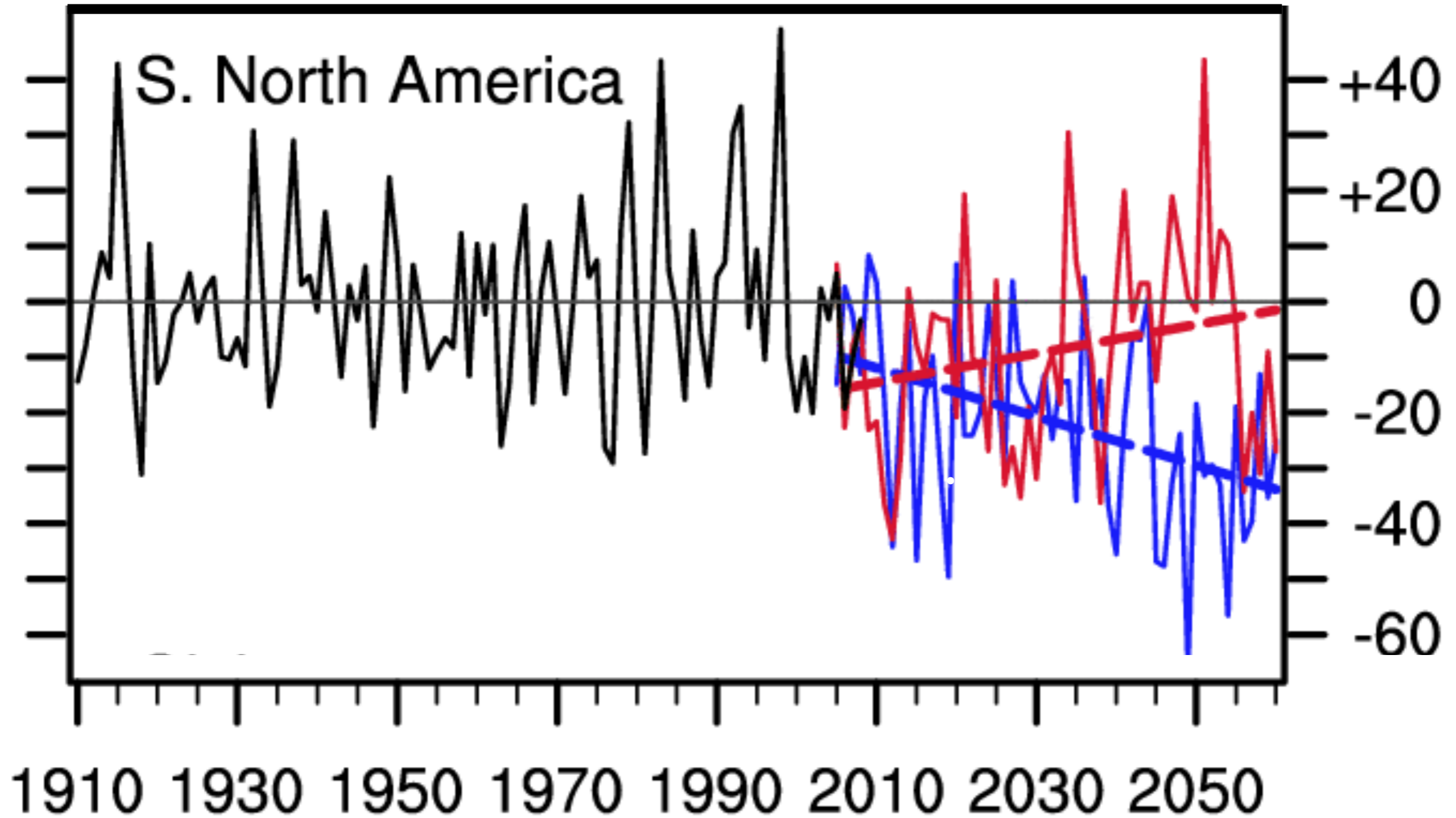
*Jul 06 Hour 03*



# (I) Human Behavior

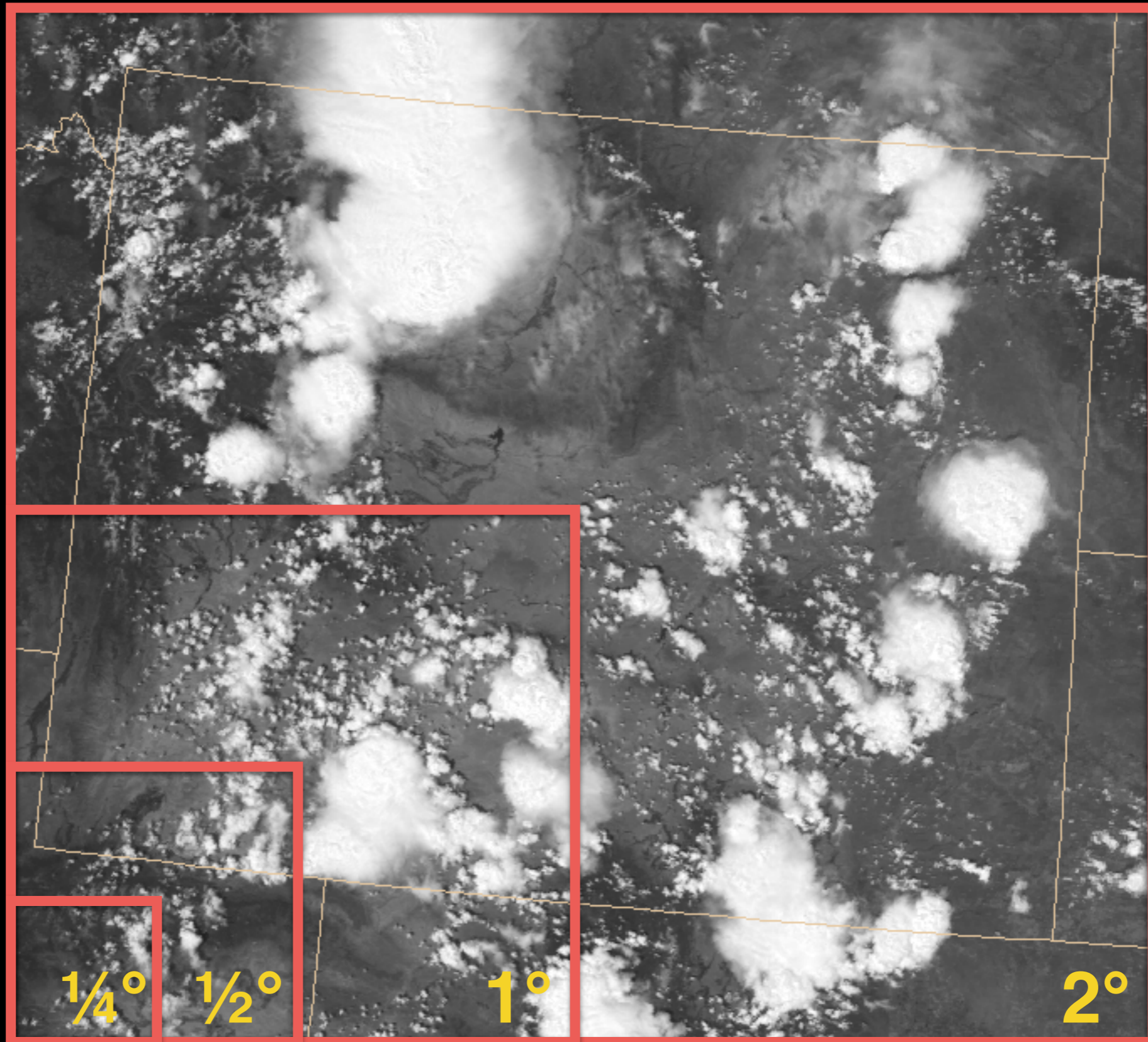


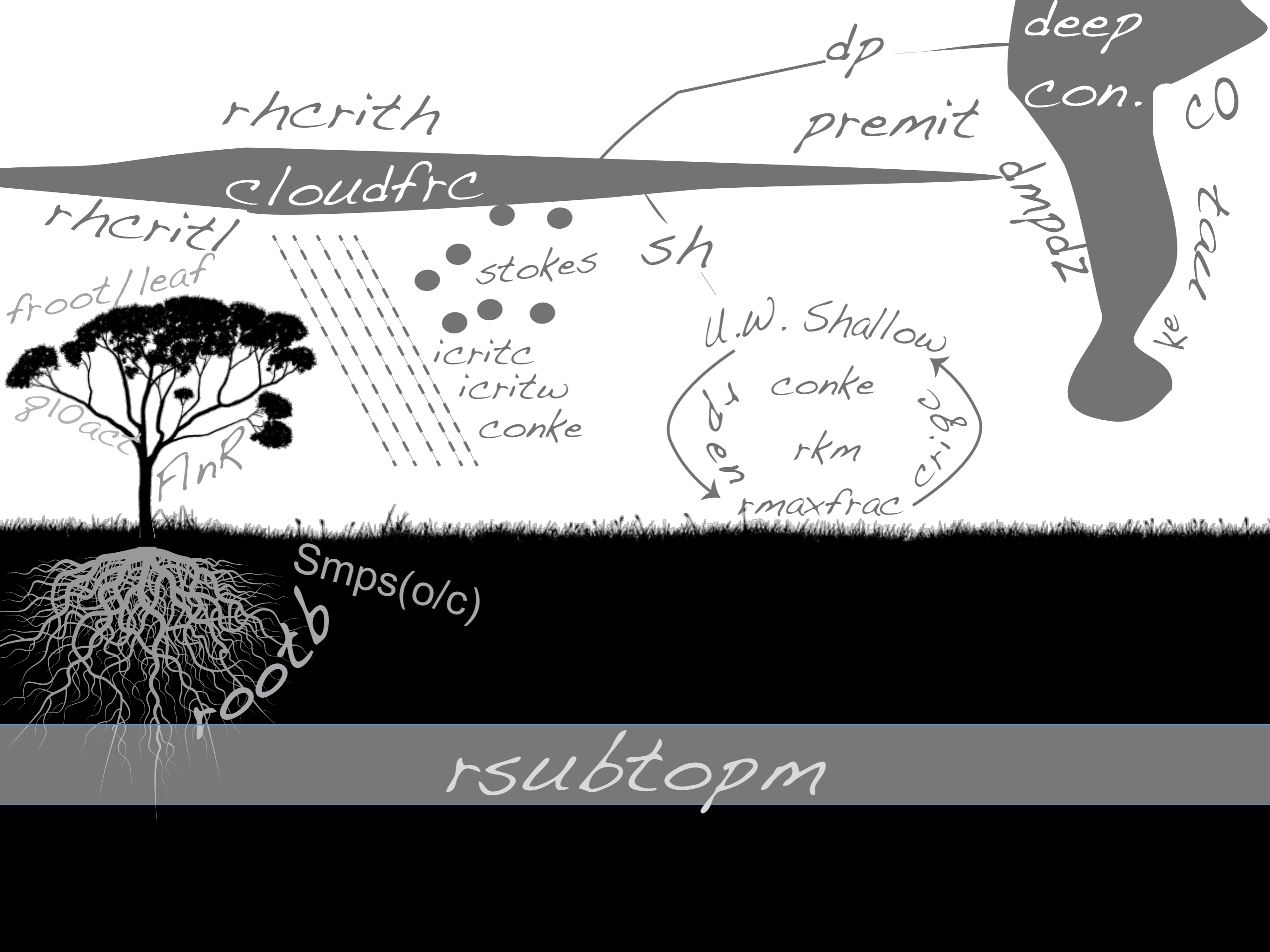
## (2) Butterflies and hurricanes





## (2) The devil in the grid box

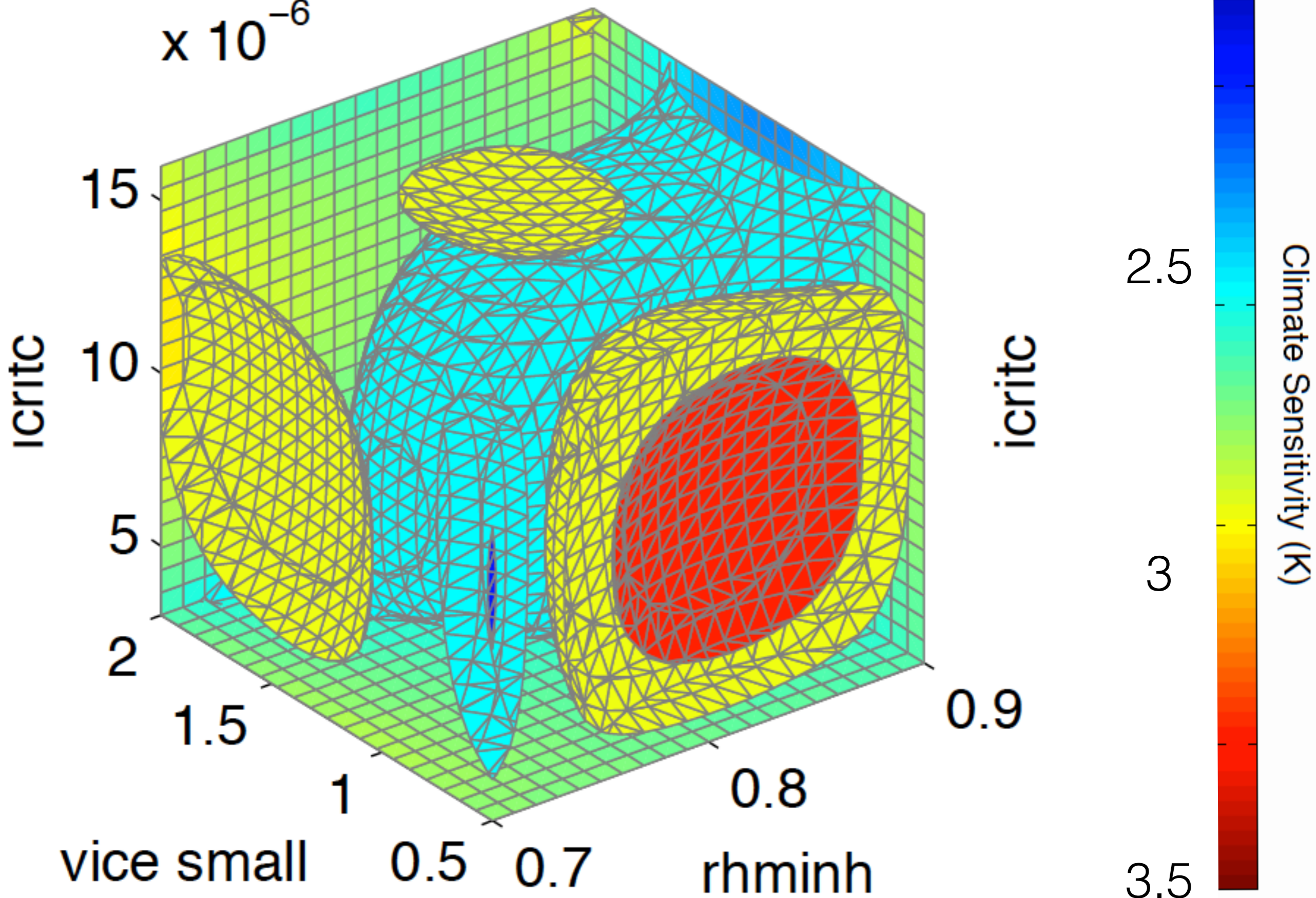






dmpdz=0

$\times 10^{-6}$



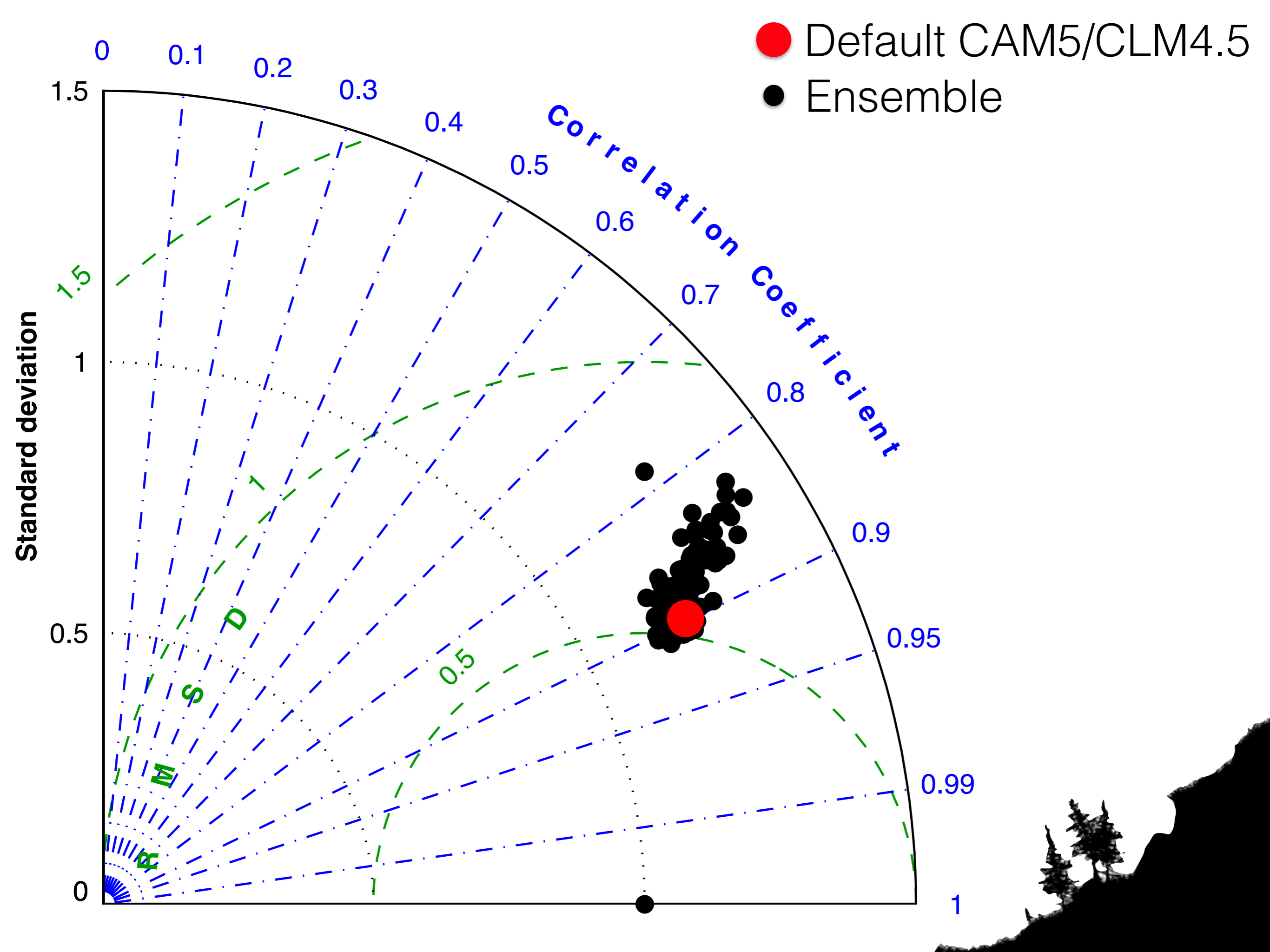
32 Parameters

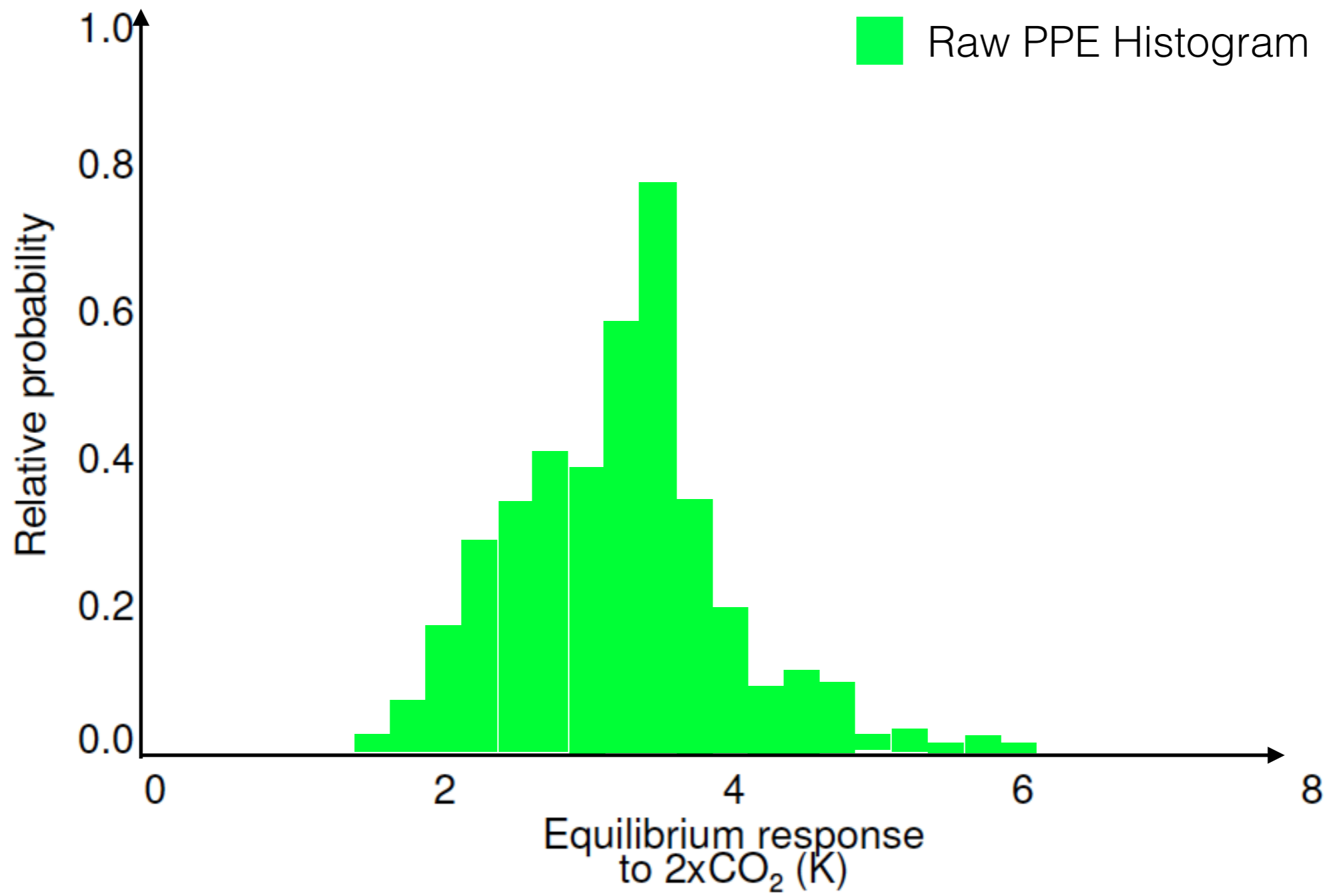
$3^{32} = 2$  trillion simulations

Global energy production  
for

3 million years







# History Matching

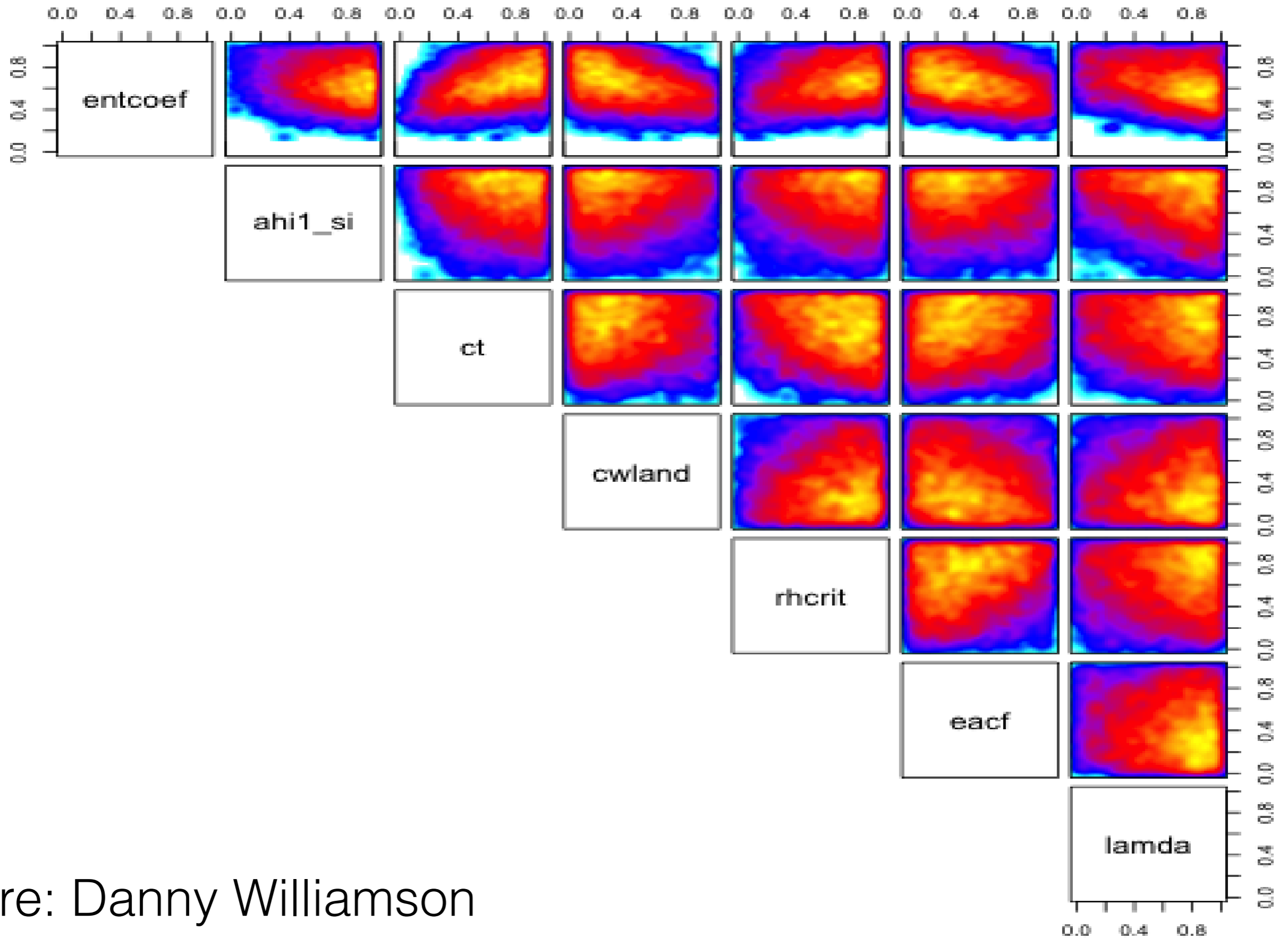
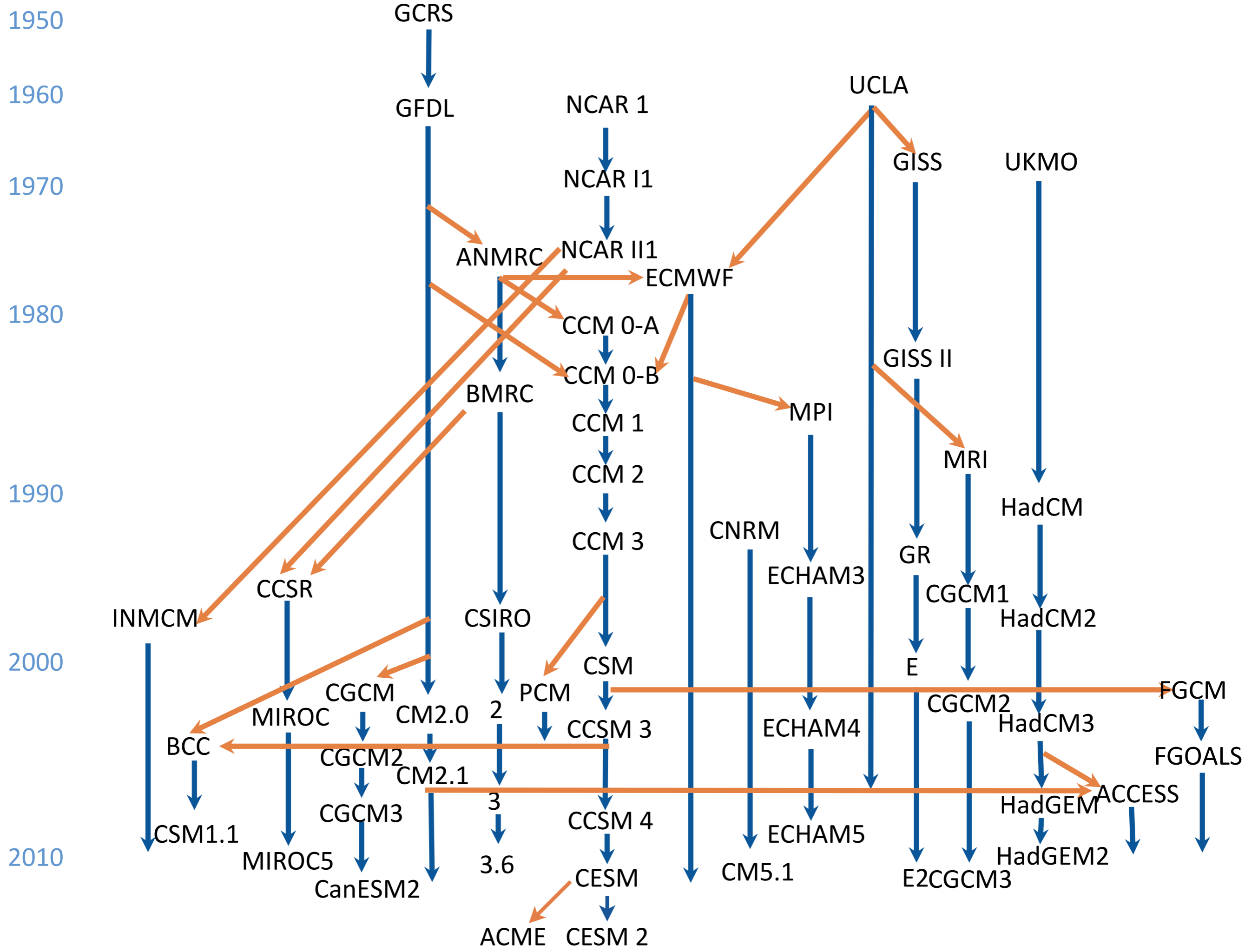


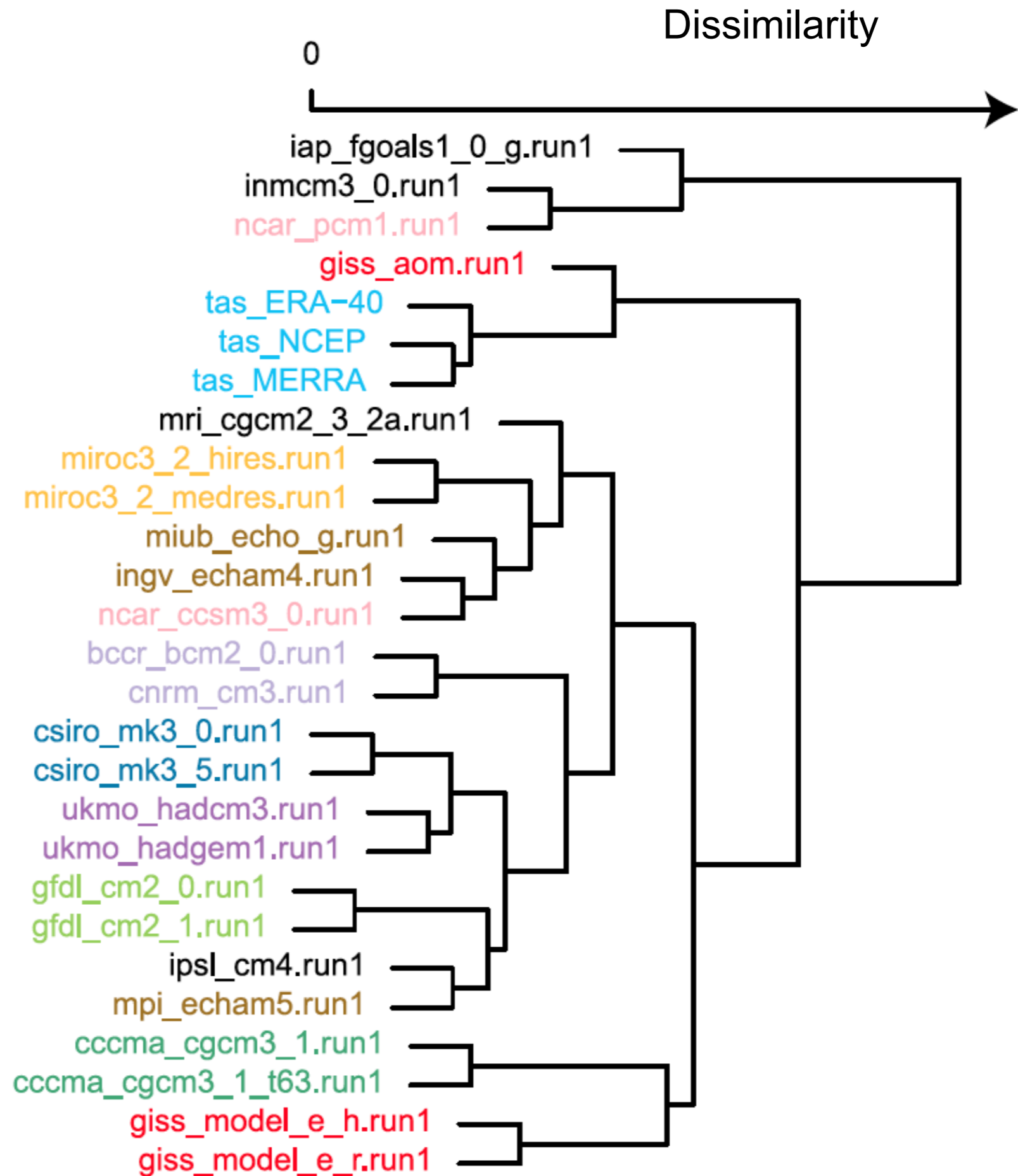
Figure: Danny Williamson





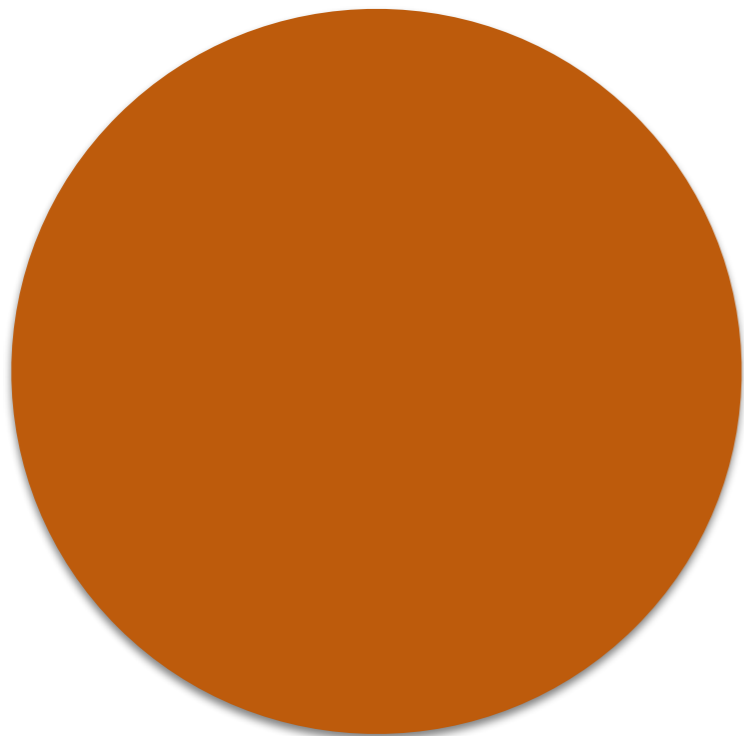
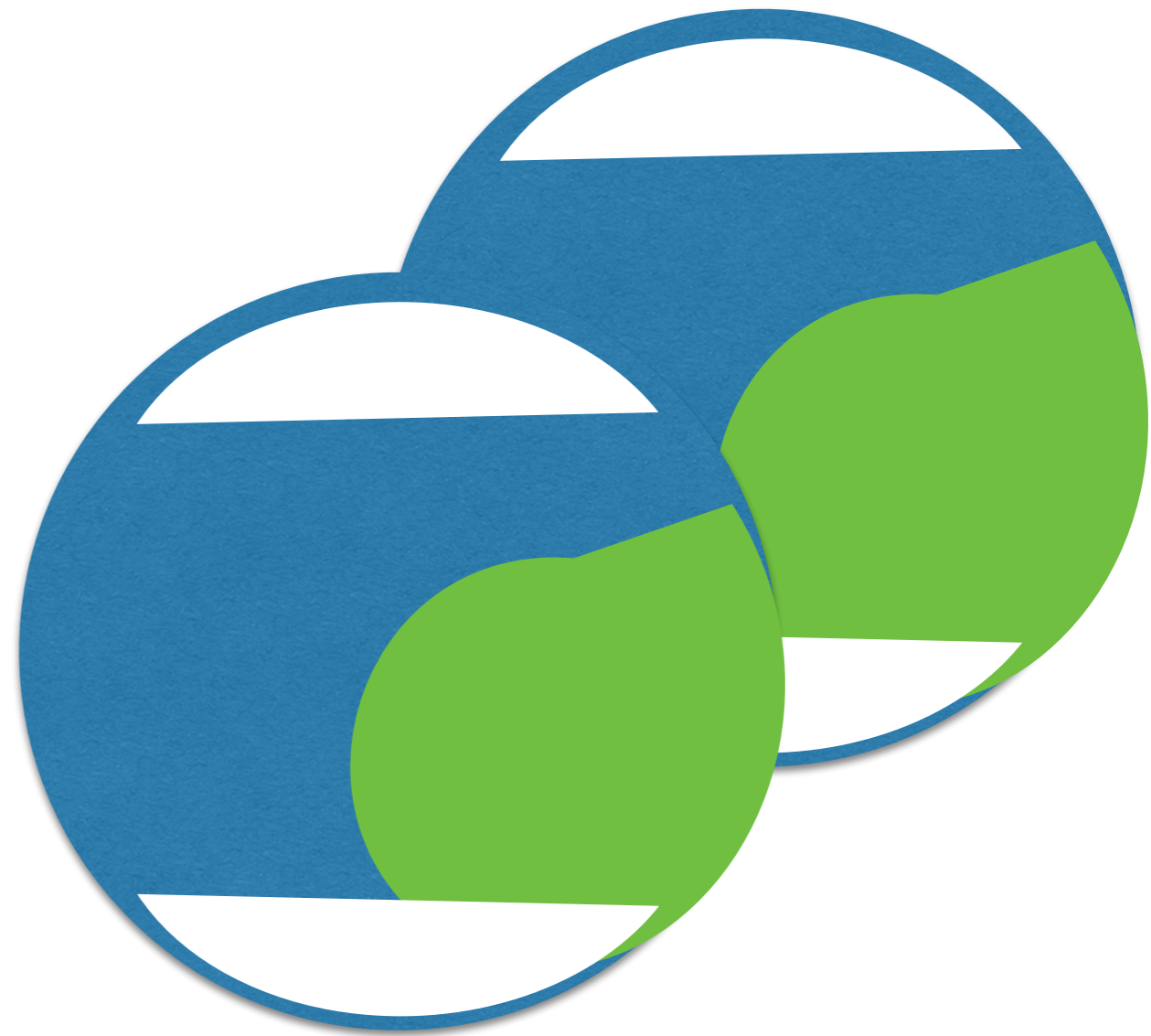
# Model Similarity

Masson *et al* (2011)



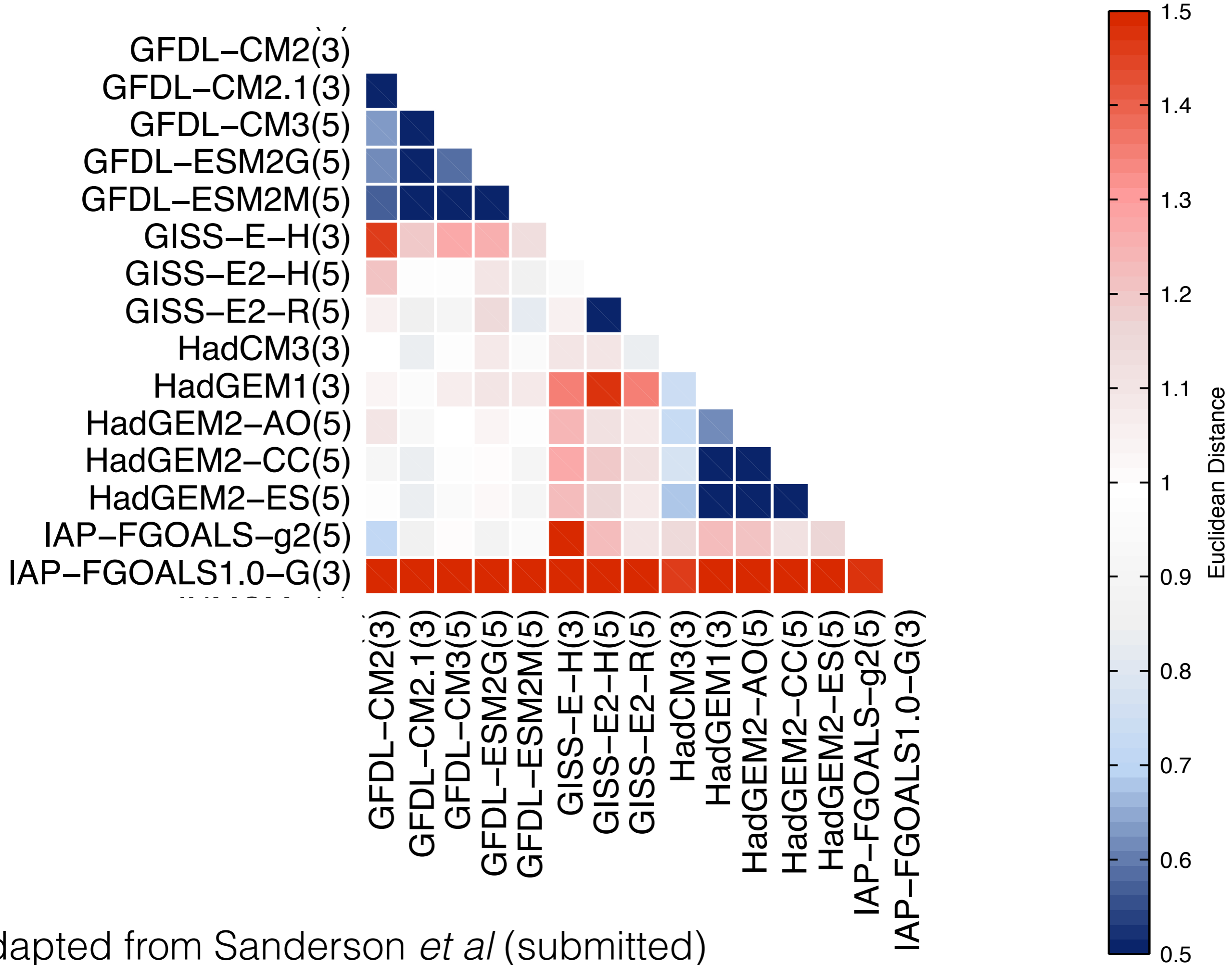
## A challenge for multi-model analysis

1. Adding a replica of an existing ensemble member should not change the result



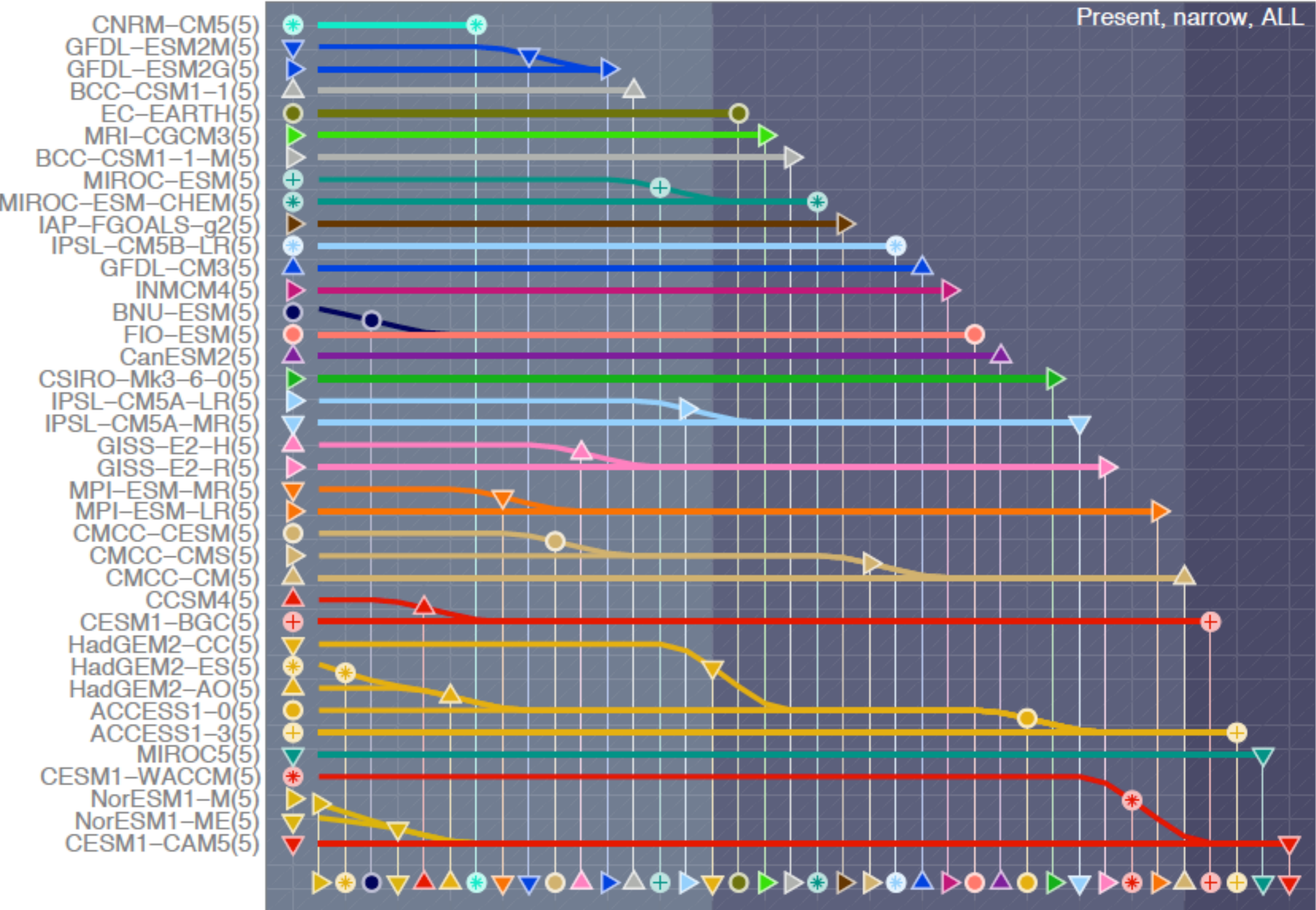
2. Adding a model of Venus to the ensemble should not change the result



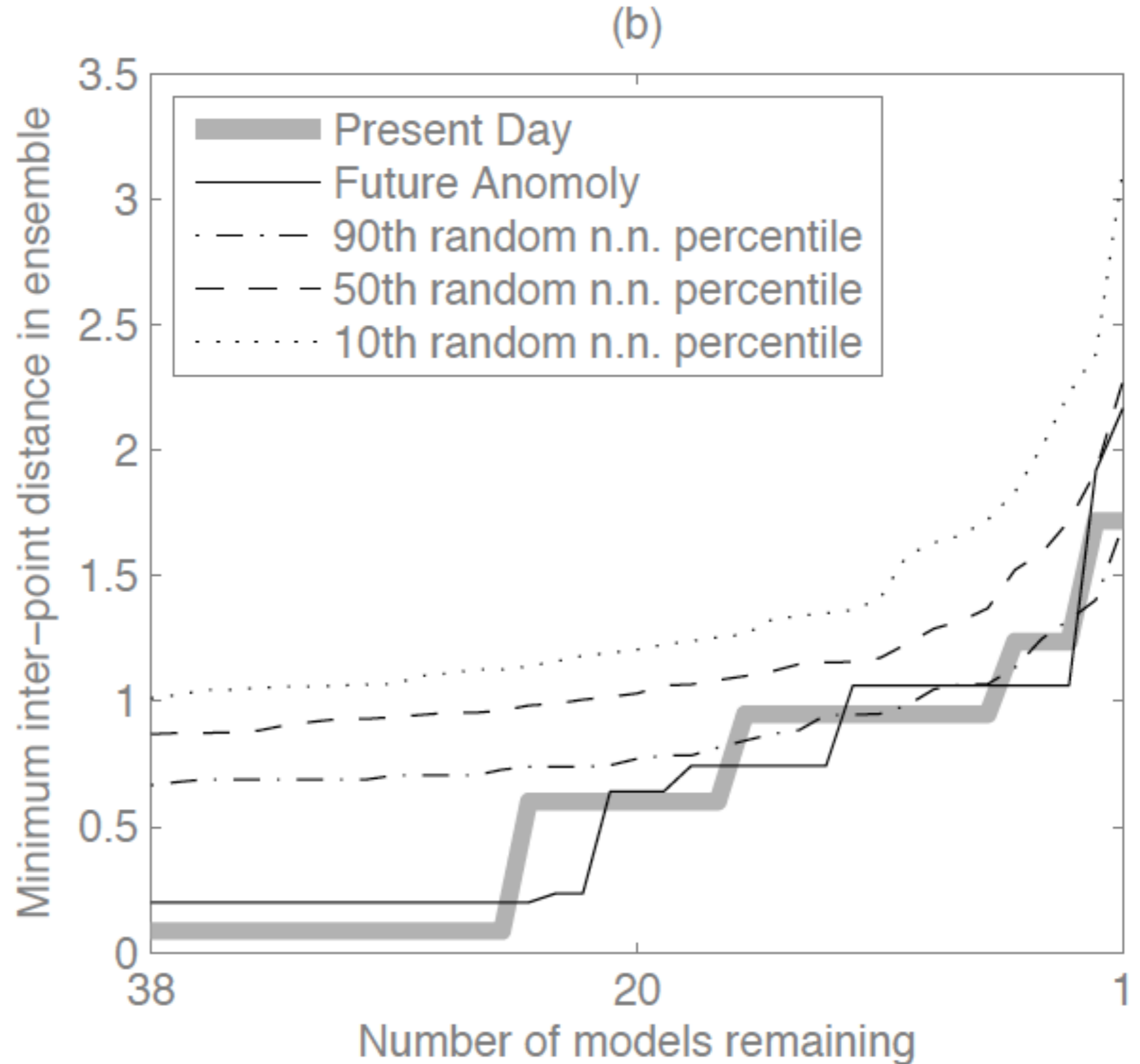


adapted from Sanderson *et al* (submitted)

# Or elimination?

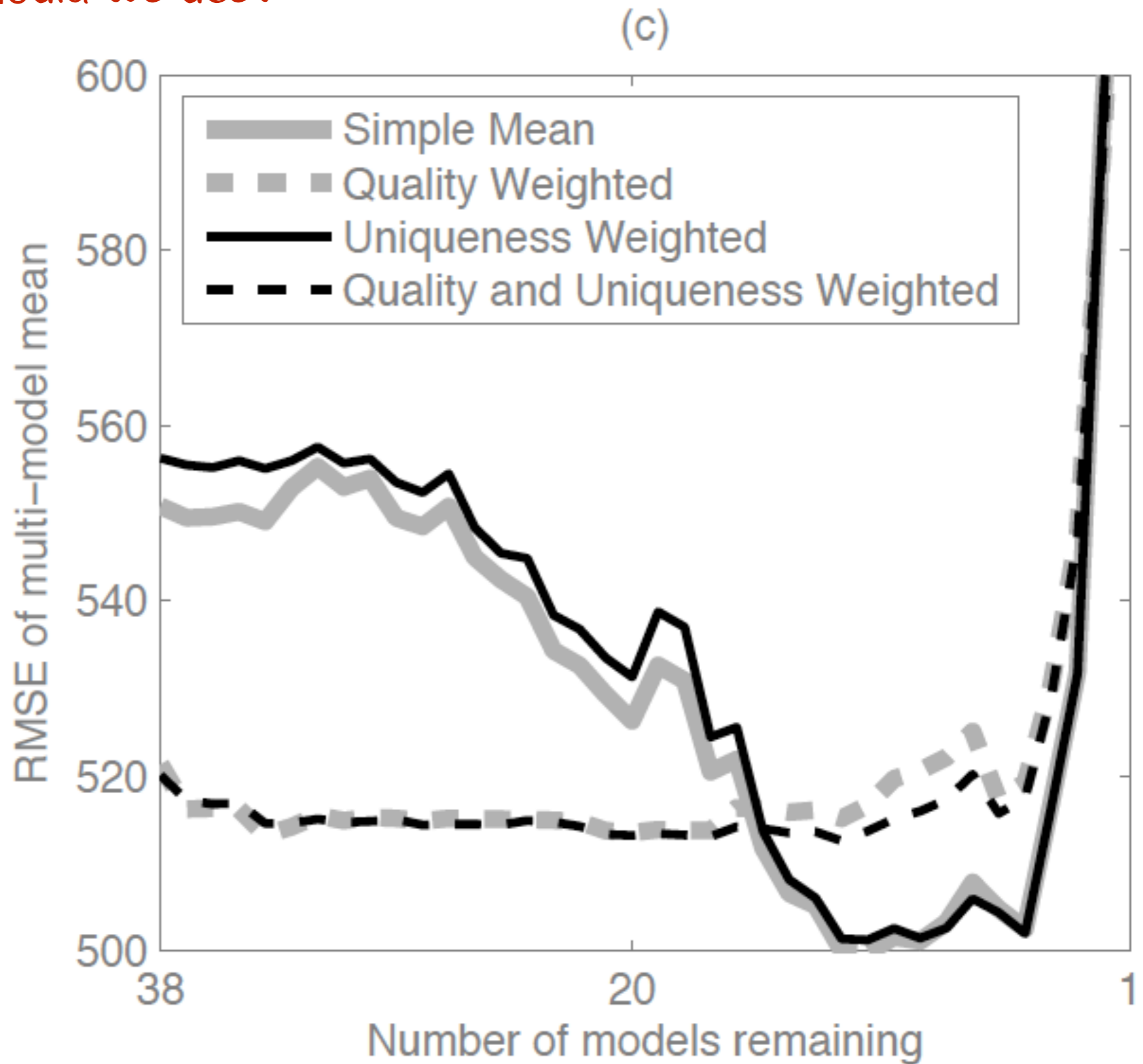


# How many models are there?





And how many should we use?



Questions?