



# **Key Uncertainties in the Global Carbon-Cycle:**

Perspectives across terrestrial and ocean ecosystems

Quinn Thomas (Virginia Tech)  
Naomi Levine (USC)

Annalisa Bracco (Ga. Tech)  
Curtis Deutsch (Washington)  
Matt Long (NCAR)  
Galen McKinely (Wisconsin)



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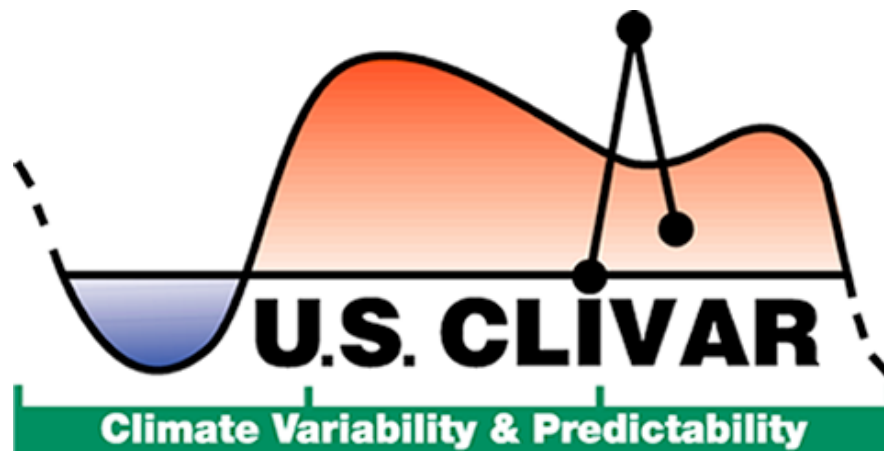
## Advanced Study Program

Developing Scientific Leaders of the Future



# NCAR

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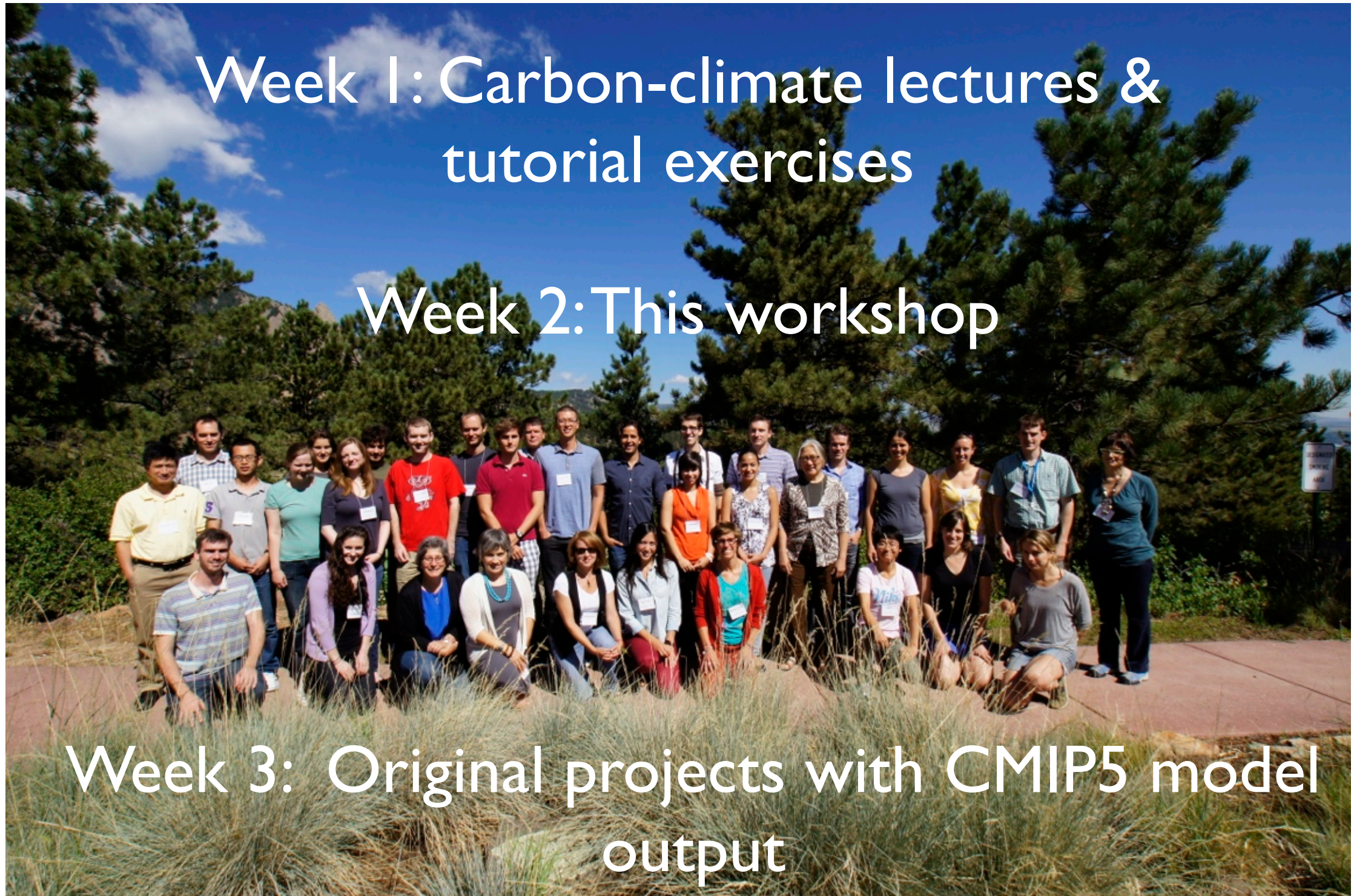


# ASP Summer Colloquium 2013: Carbon-Climate Connections in the Earth System

Week 1: Carbon-climate lectures &  
tutorial exercises

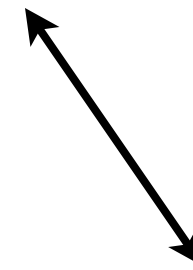
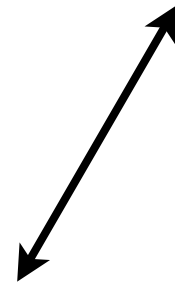
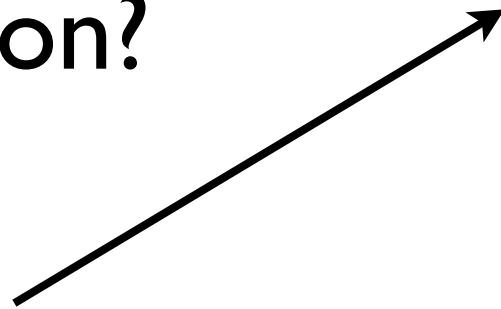
Week 2: This workshop

Week 3: Original projects with CMIP5 model  
output





How do ocean and terrestrial processes alter the allowable emissions for climate stabilization?



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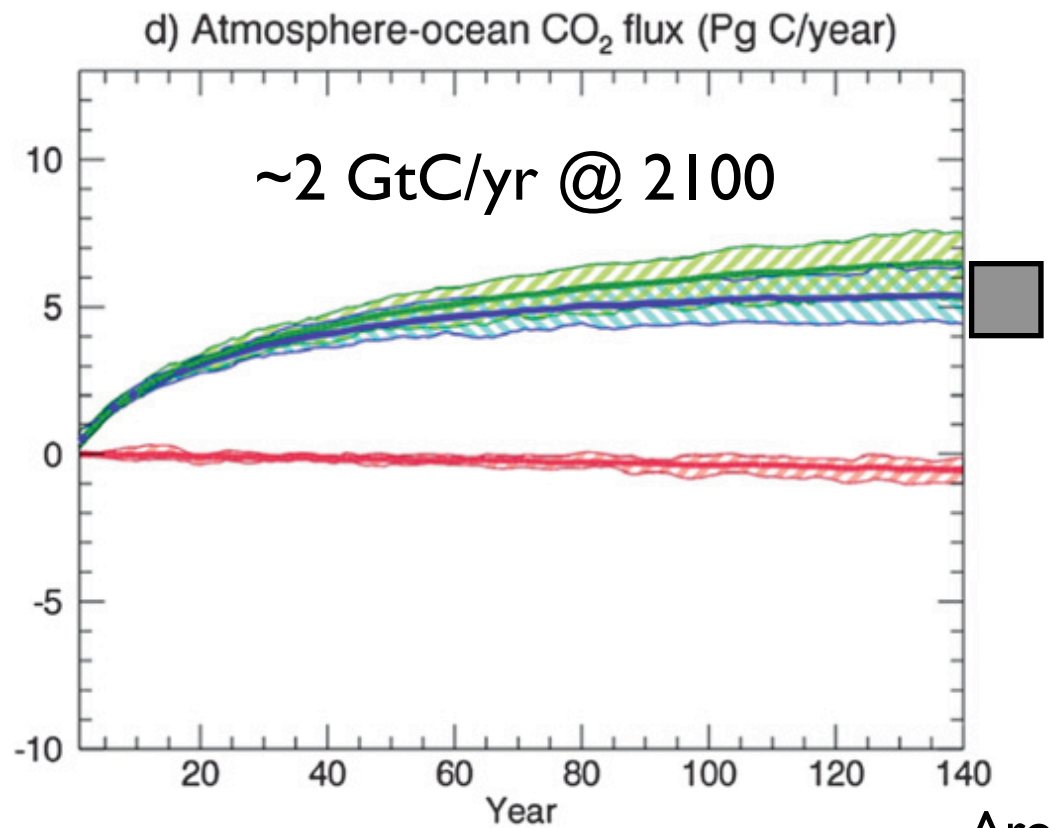
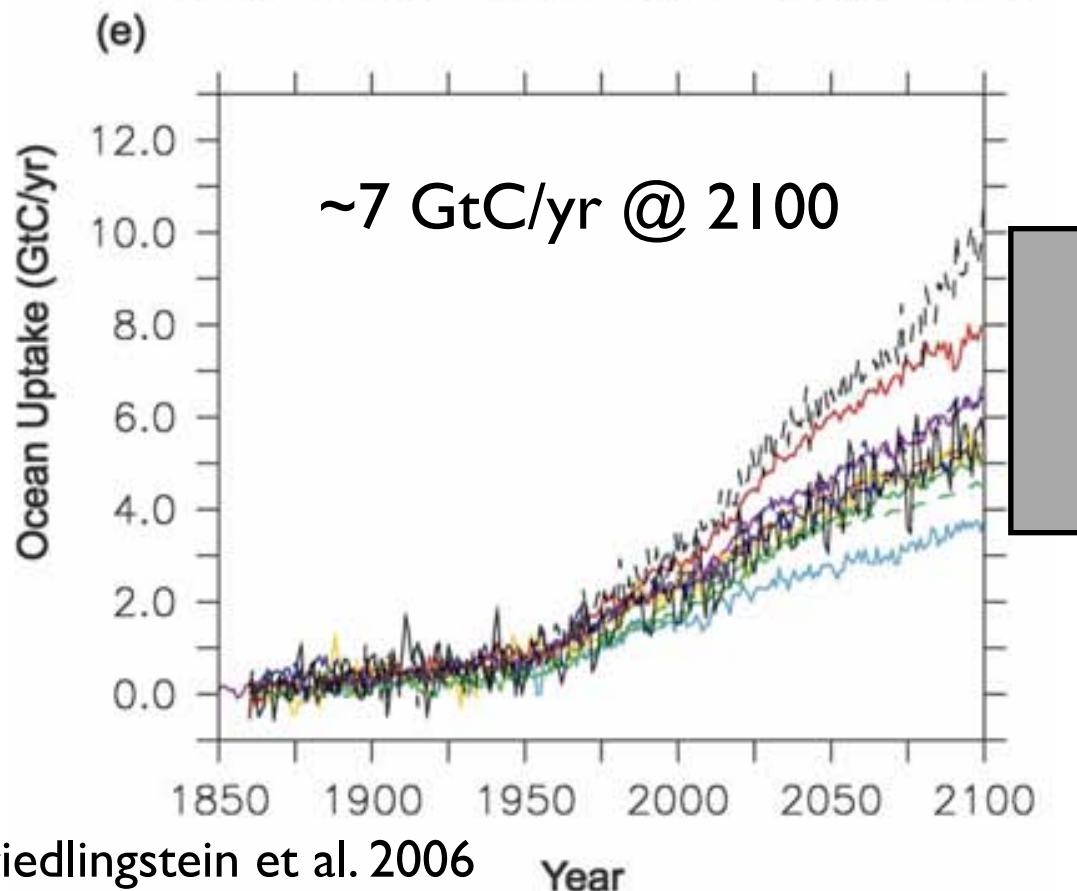
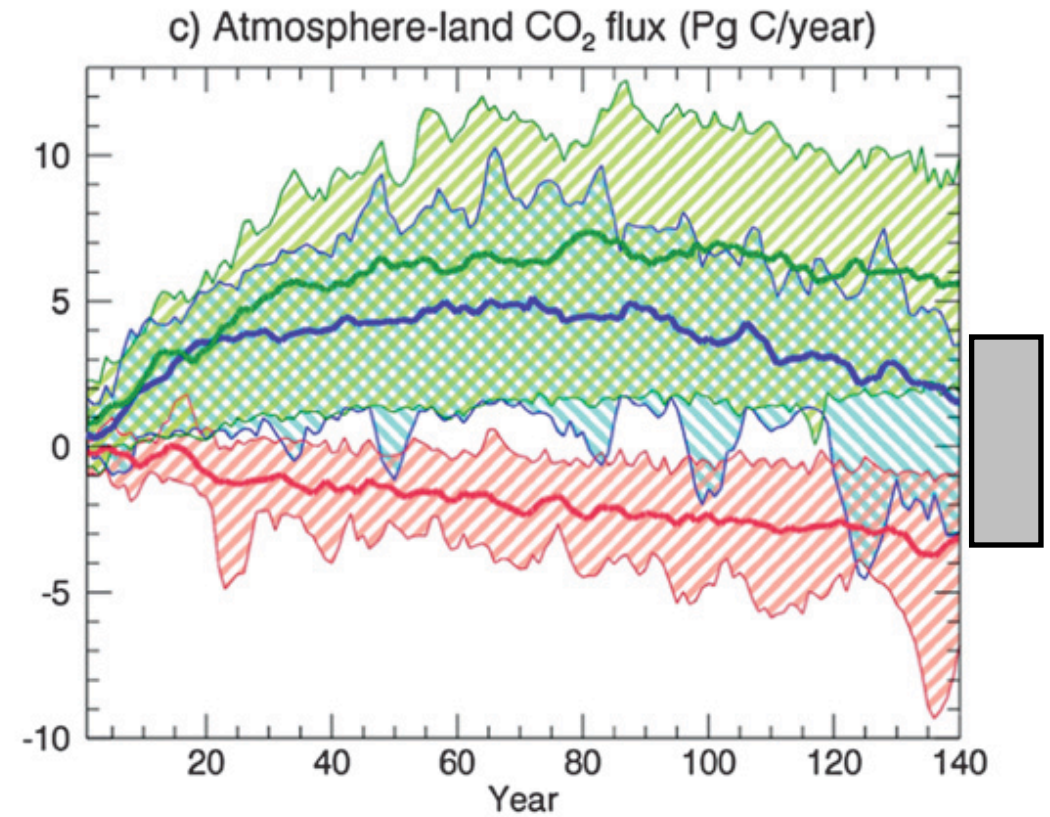
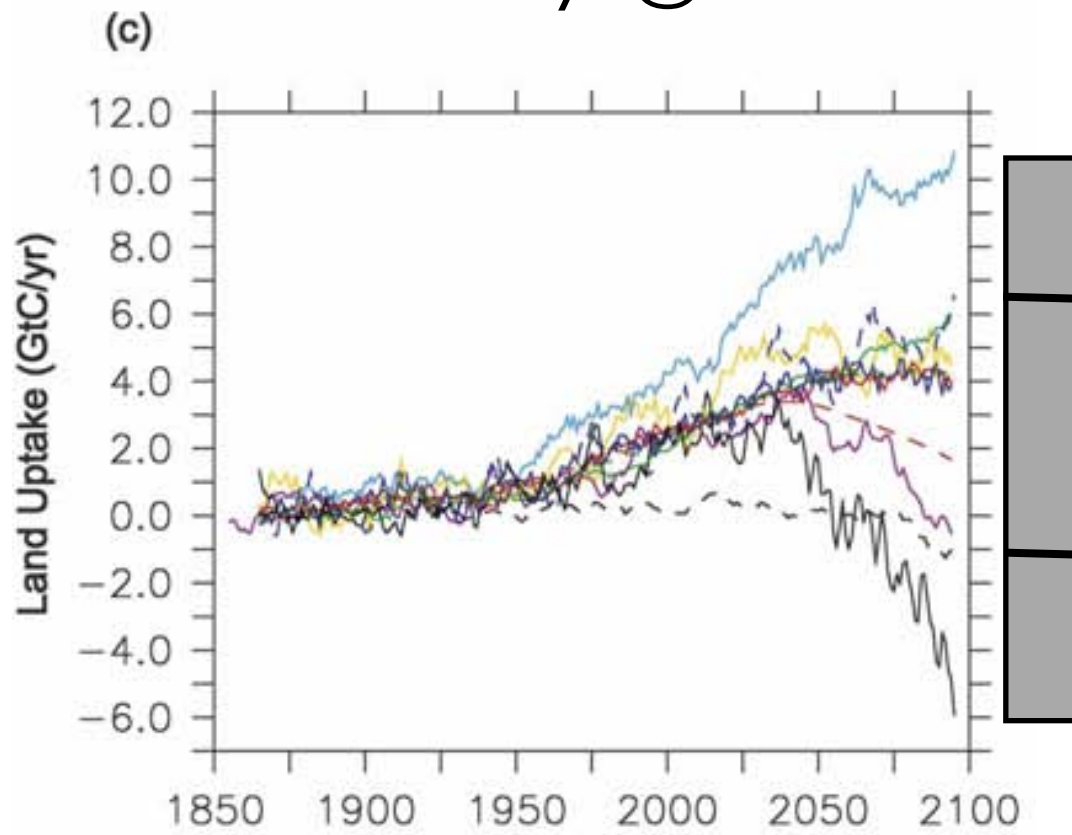
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# Uncertainty among models

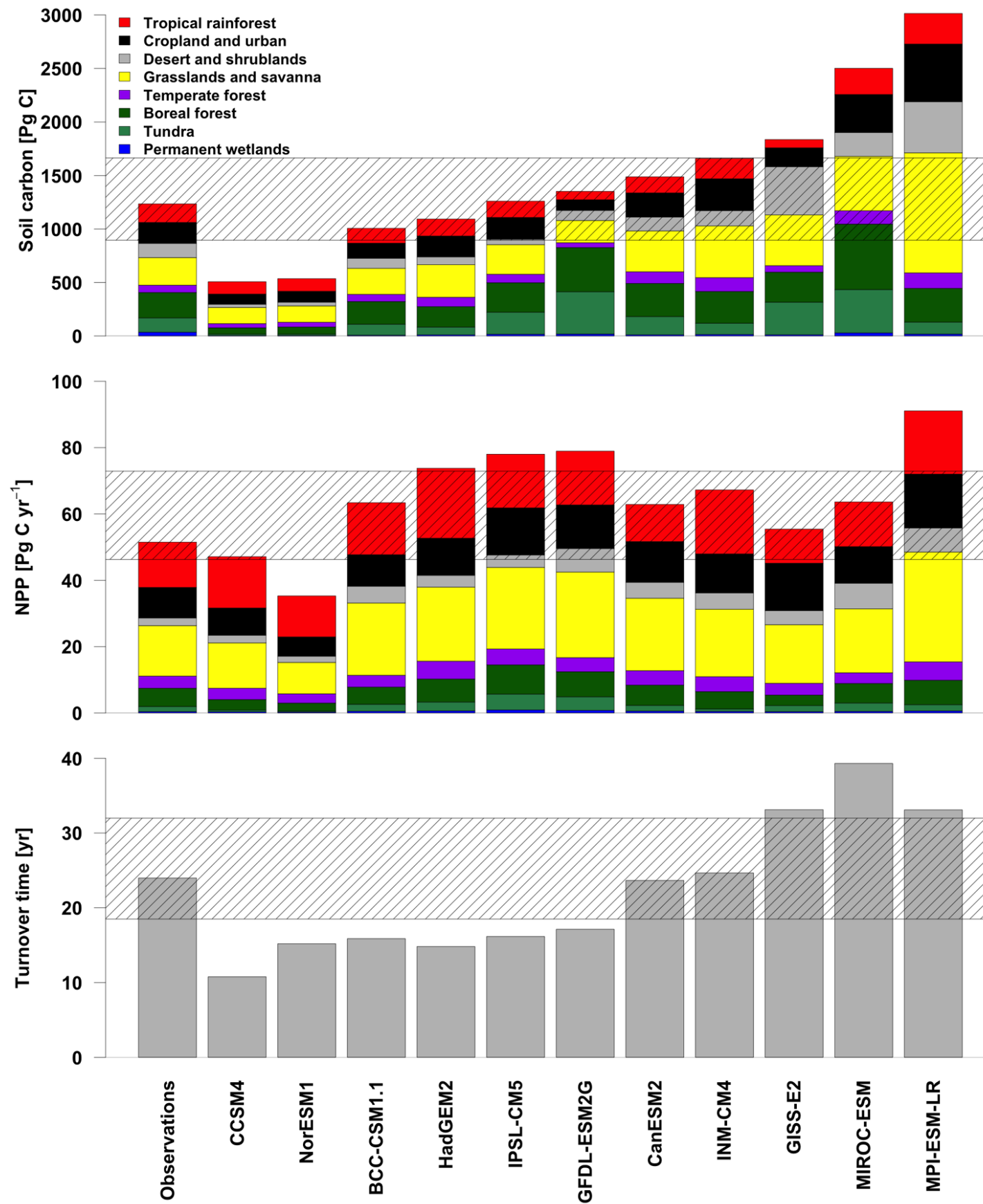
~16 GtC/yr @ 2100

~8 GtC/yr @ 2100





# Uncertainty when compared to data



What important processes are unaccounted for in carbon-climate simulations and how do they contribute to the uncertainty?



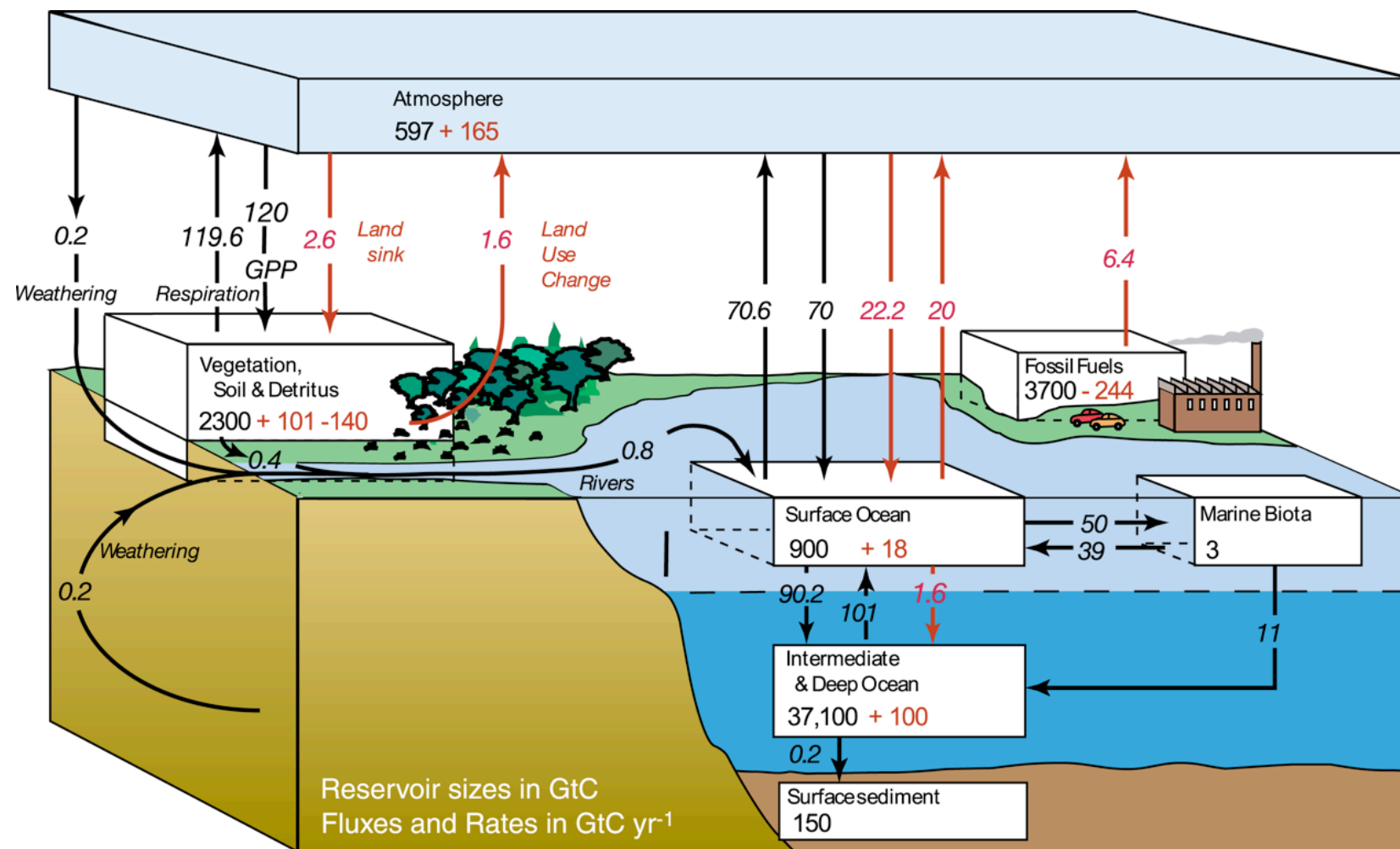


**How are the processes similar  
between ocean and terrestrial  
ecosystems?**

**How can research progress in one  
ecosystem help inform the other?**

# This week:

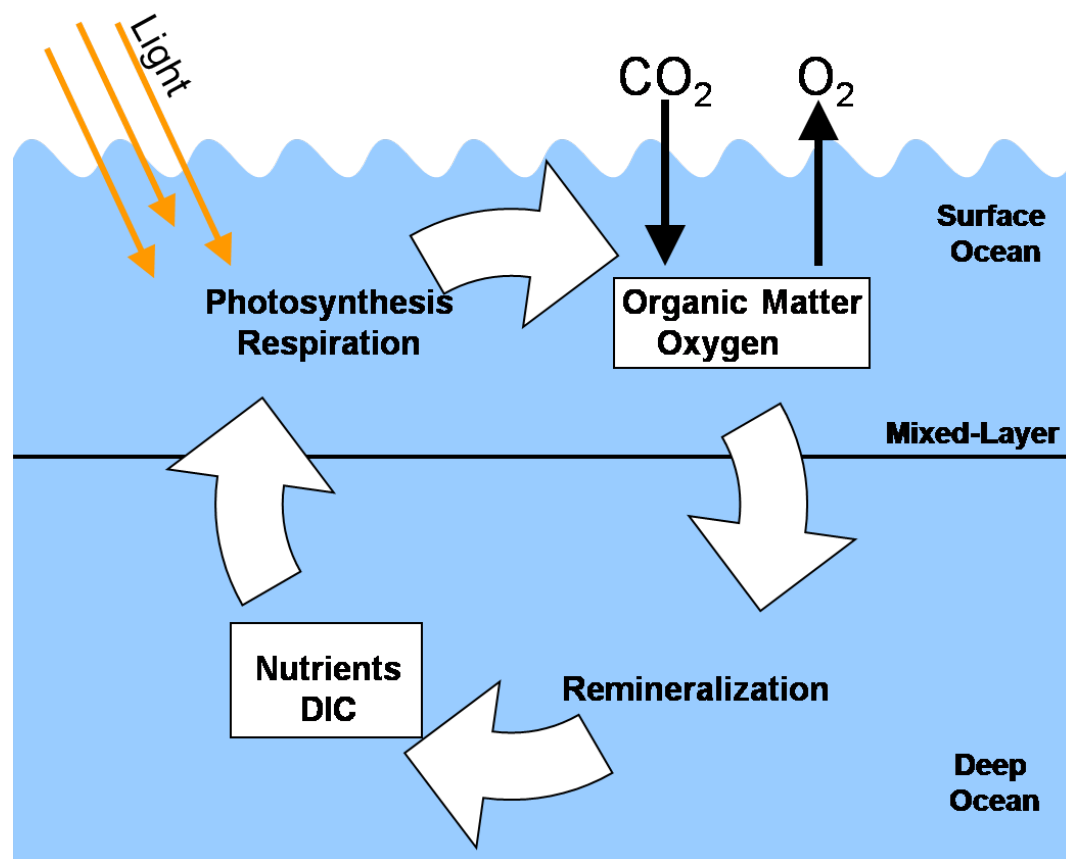
## Overview of the state of carbon-climate interactions





# This week:

Are important remineralization pathways and dynamics missing from carbon-climate simulations?

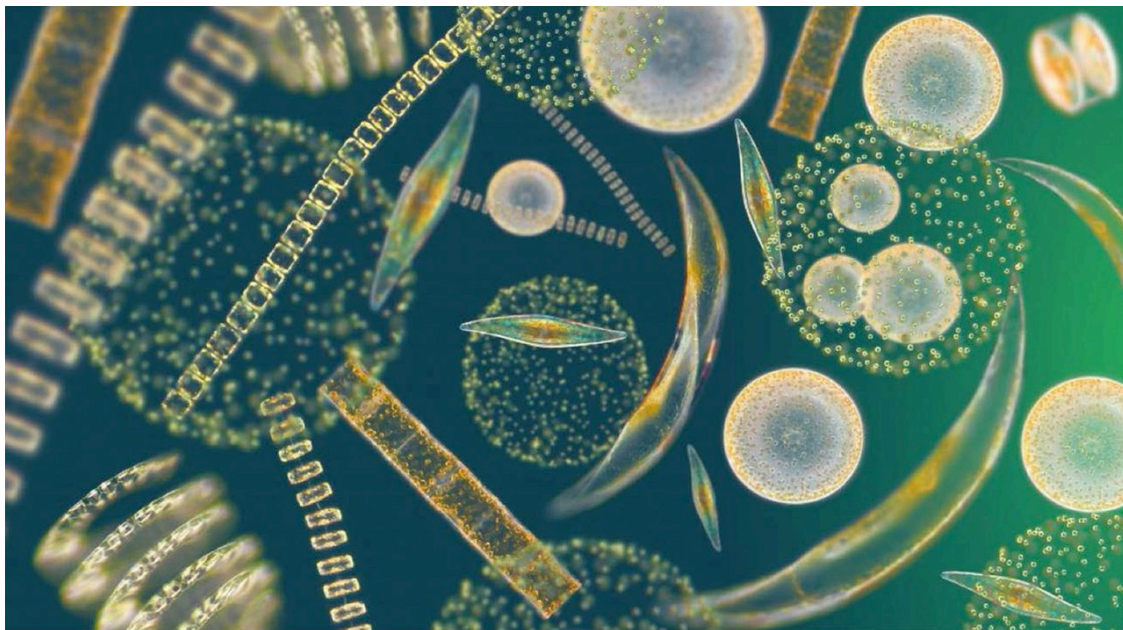


N. Cassar, Duke



# This week:

What are the impacts of including demographic dynamics of individual organisms on carbon-climate interactions?



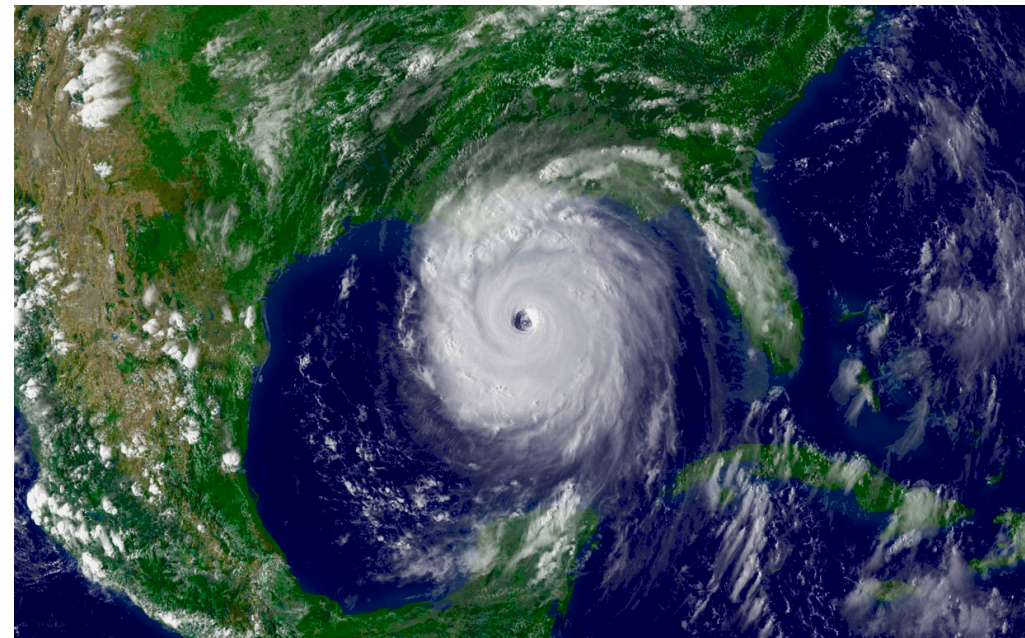


# This week:

How does variability in physical climate influence carbon-climate interactions?



Credit: © BAS



noaa

# This week:

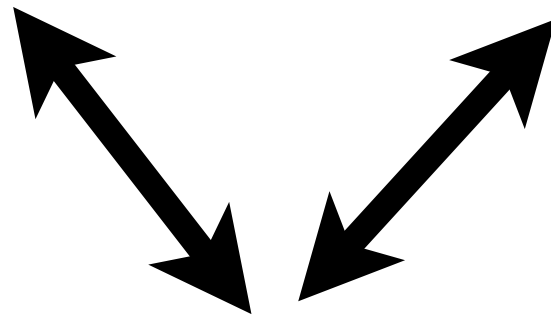
How should we best represent trophic dynamics in models of carbon-climate interactions?





# This week:

How can data be used to constrain the modeled dynamics of these ecosystem processes?



## Goals

1) Have cross-system discussions throughout the week.

*45 minute talks with 15 minutes of discussion*

*30 minutes talks with 10 minutes of discussion*

*2 poster sessions*

2) Outline the key processes that are missing from the carbon-climate uncertainty estimates and potential paths forward to better including the processes in Earth System models.

3) Engage interested participants in preparing a review paper that will serve as an overview of the processes for both ocean and terrestrial communities.

4) Have fun!



# The plan

- 1) Verbal discussion around talks and posters.
- 2) Written collaborative interactions through a Google document.
- 3) Break out groups to highlight the key processes missing from the uncertainty.