

Carbon-Climate Connections and Implications for Society - including Carbon Management

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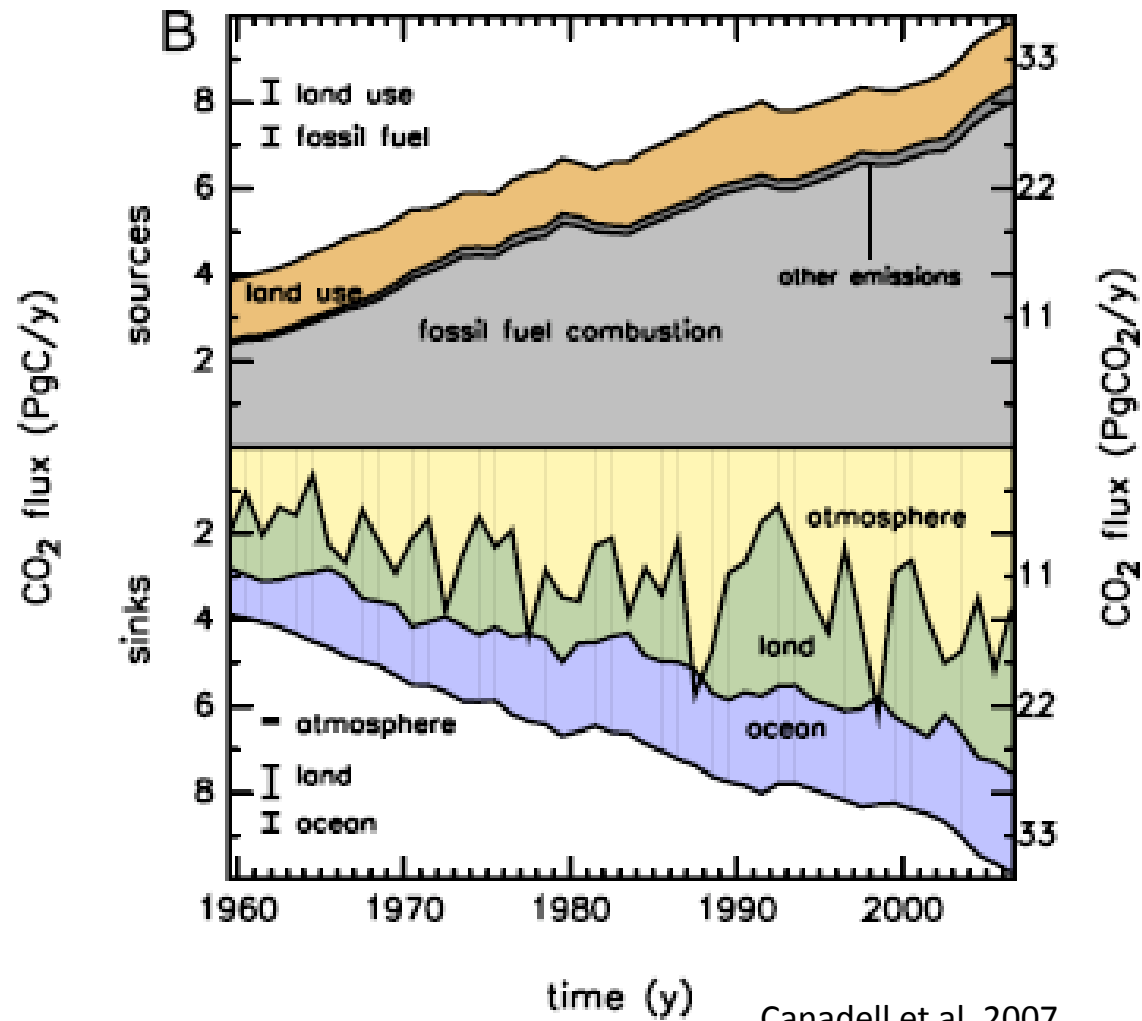
Richard Birdsey: USDA – Forest Service

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Breakout III Discussion Questions

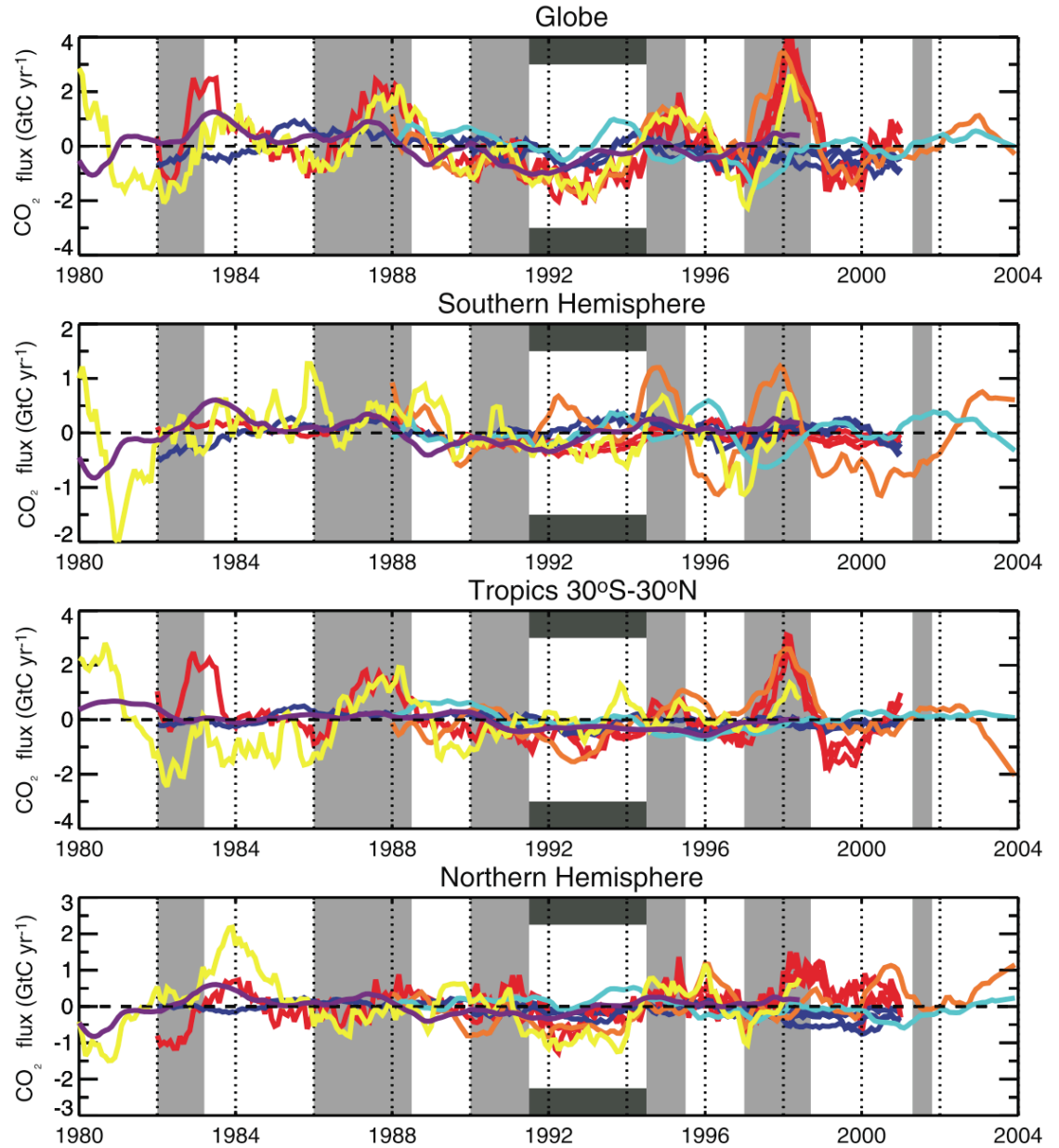
- What are the most important science questions?
- What are the most promising opportunities for interdisciplinary collaboration; for enhanced coordination?
- Where will there be strong societal benefits?
- How can upcoming NASA missions address topics of interest?

Carbon cycle variability and trends – What are the driving mechanisms?



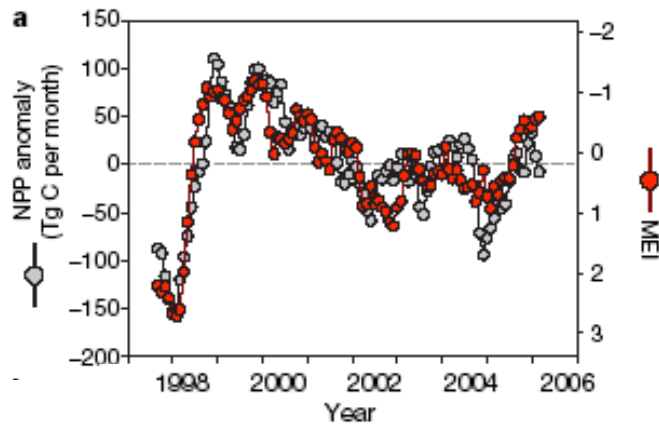
Flux variability is connected to ENSO, and dominated by land

Baker et al. 2005 (orange = land ; cyan = ocean)
Rodenbeck et al. 2003 (red = land ; blue = ocean)
Bousquet et al. 2000 + (yellow = land ; purple = ocean)

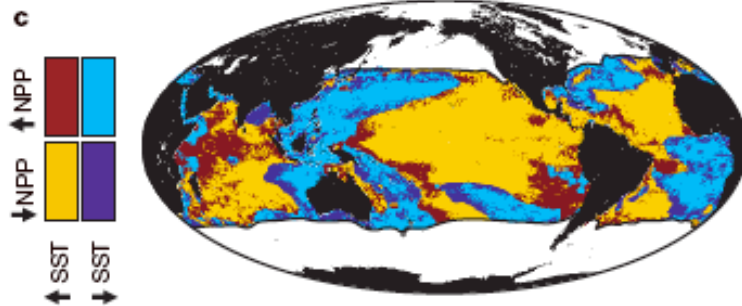
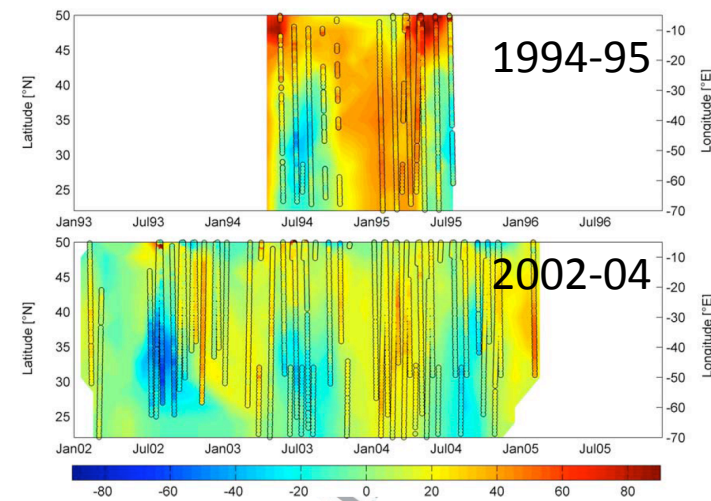


Ocean trends

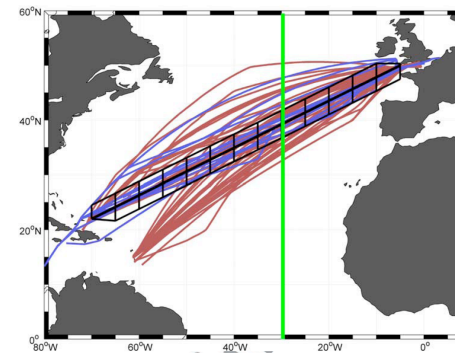
Changing ocean productivity, 97-06



ΔpCO_2 decline, N. Atlantic



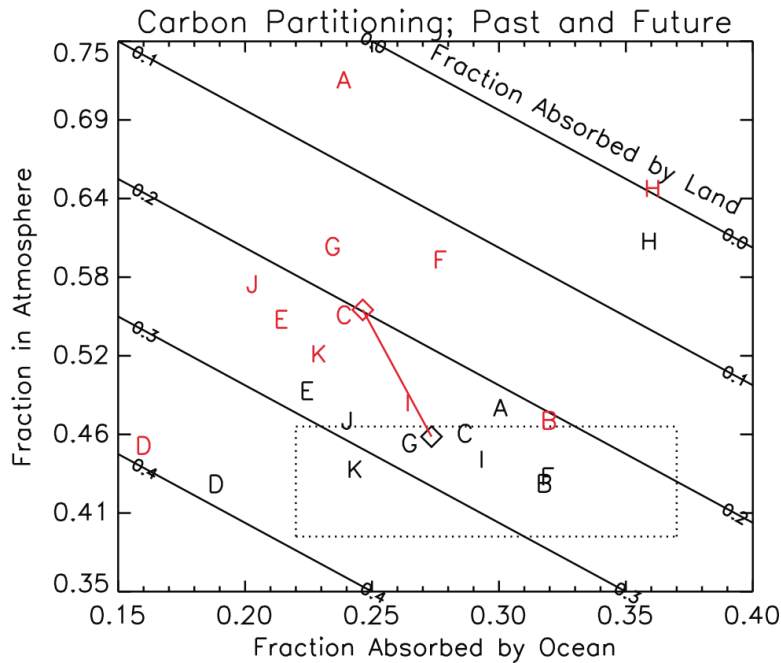
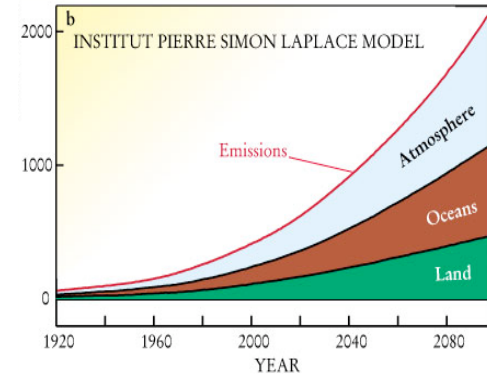
Behrenfeld et al. 2006



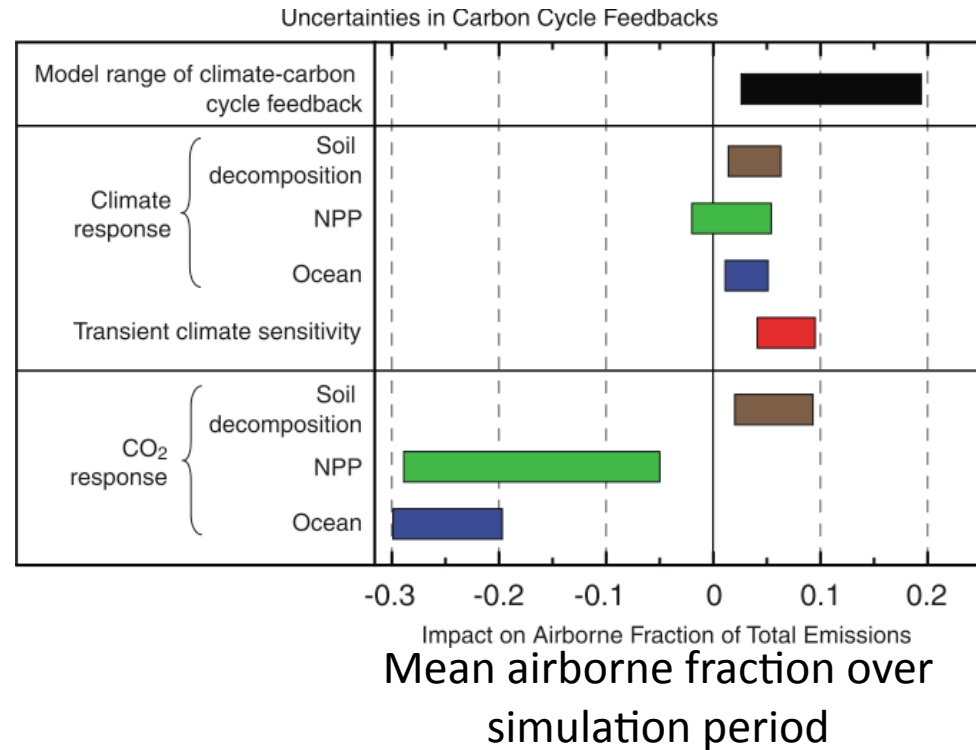
Shuster and Watson, 2007

Predictions needed

IPCC WG1, Chapter 7

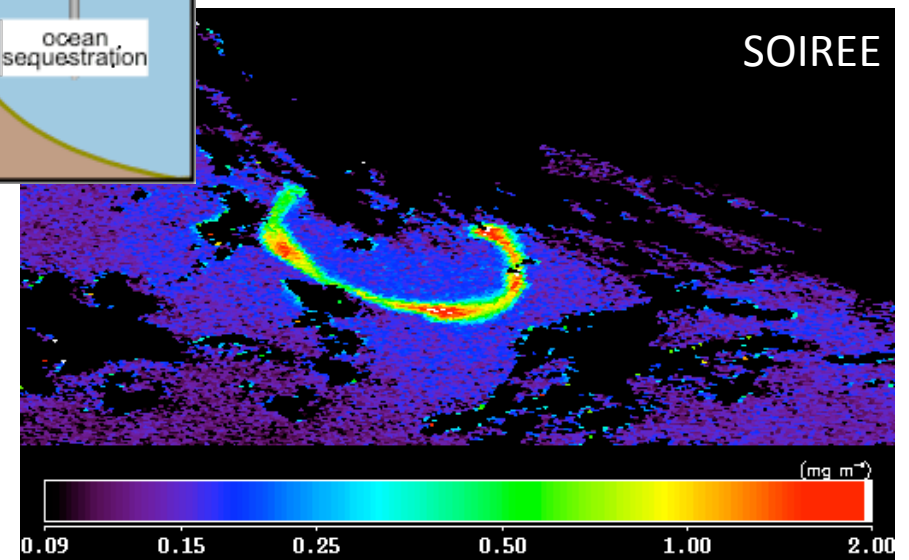
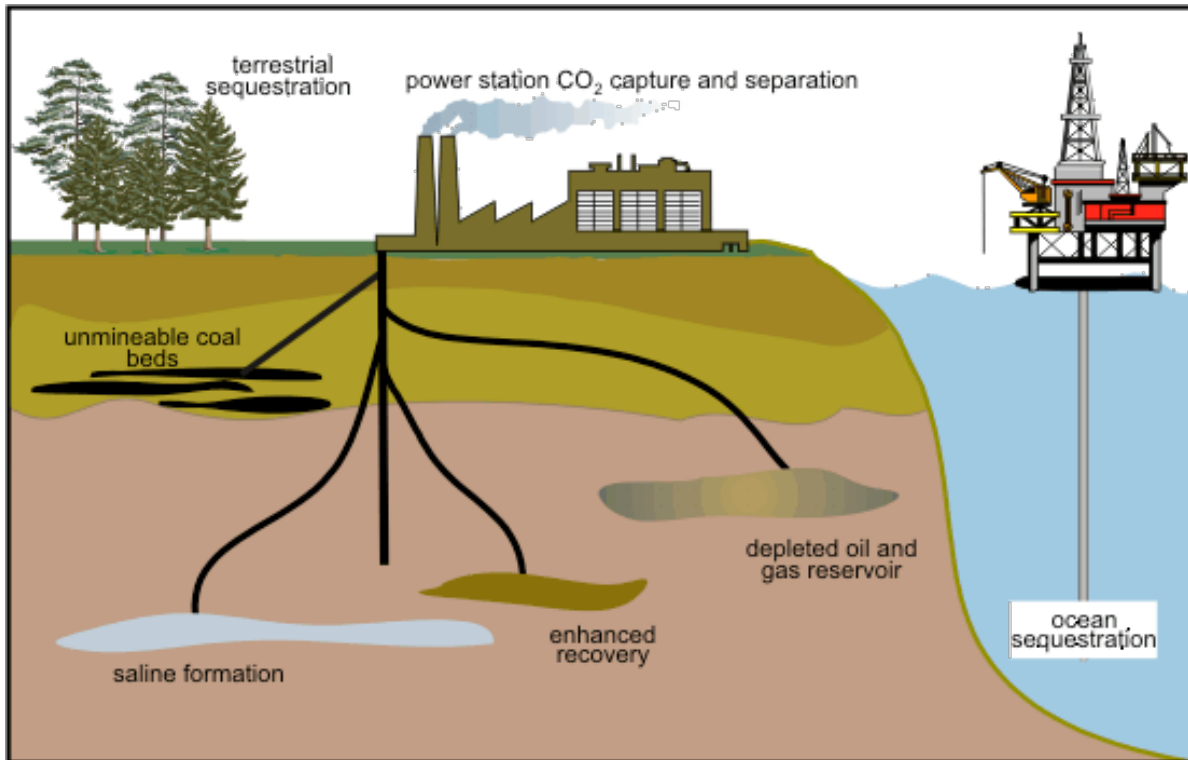


Black = through 2000
Red = through 2100



Are there tipping points?

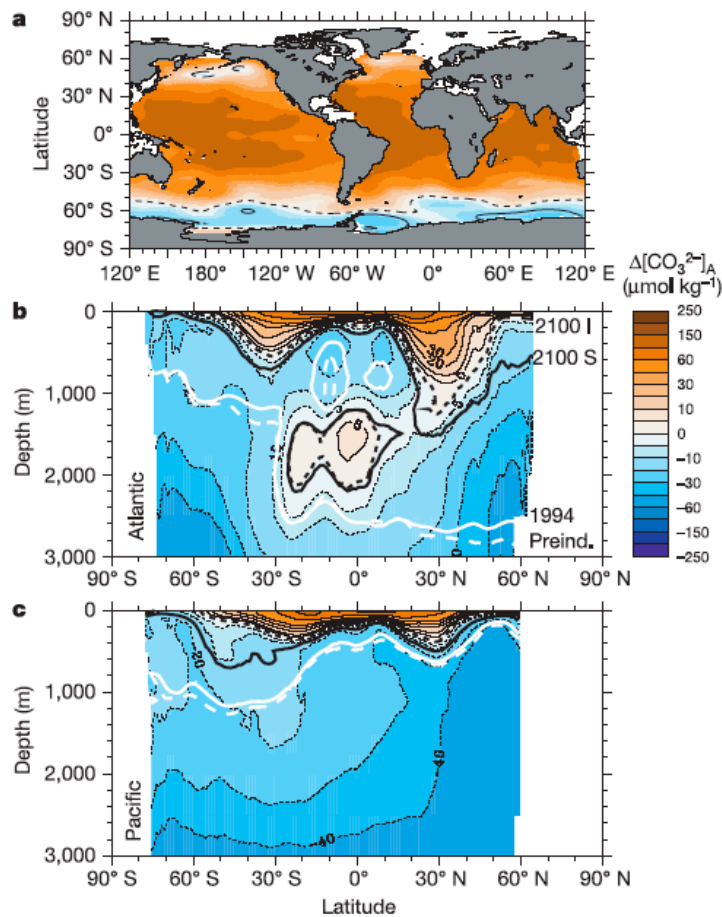
Information for management



What are the side-effects?

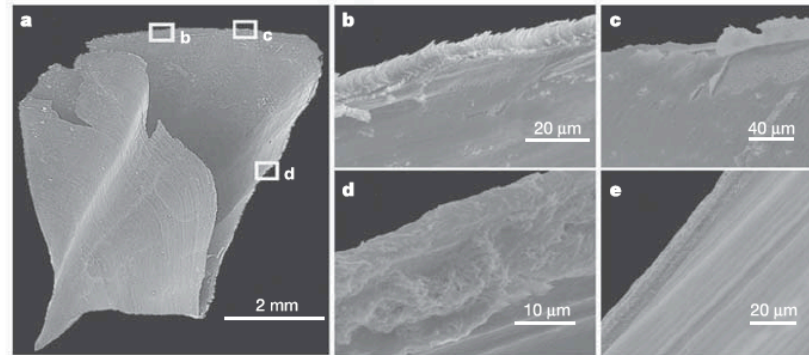
e.g. Ocean Acidification

Aragonite Saturation State in 2100

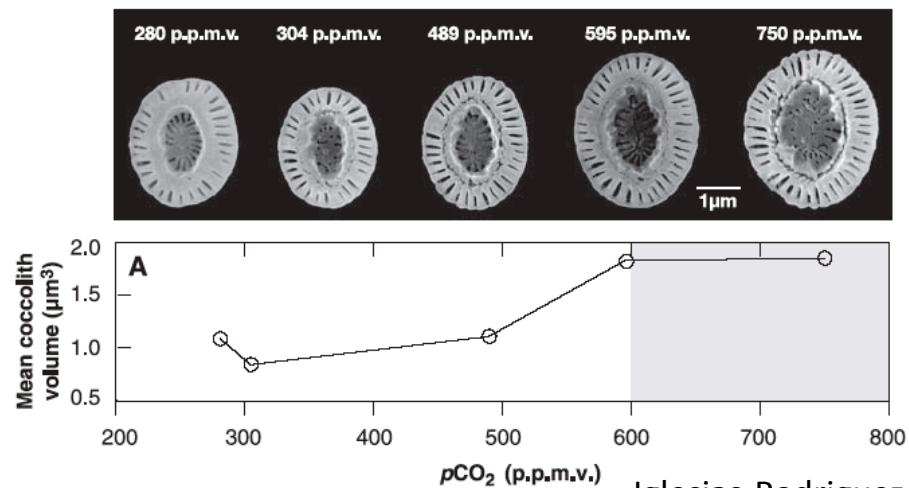


Orr et al. 2005

Bad: Pteropod dissolve



Good: Coccolithophores thrive



Iglesias-Rodriguez et al. 2008

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Breakout-Specific Discussion Questions

- What is needed to understand observed trends?
- What is required to improve predictions?
- What will promote development of effective, responsible management techniques?
- What side-effects of natural and managed sinks need to be studied?
- How to develop a holistic approach to the coupled carbon and climate systems?