

Mini-Workshop #2

AMOC's Impact on the Carbon Cycle

Near-Term Research Priorities

- **TT#4: Climate sensitivity to AMOC: climate ecosystem impacts**

Further study is required to understand the teleconnections between AMOC/North Atlantic SST and climate variability elsewhere, and the physical mechanisms of these teleconnections. Targeted studies of the impact of AMOC variability on sea ice, ocean ecosystems, sea level changes around the Atlantic Basin, and the exchange of carbon between the atmosphere and ocean are also needed.

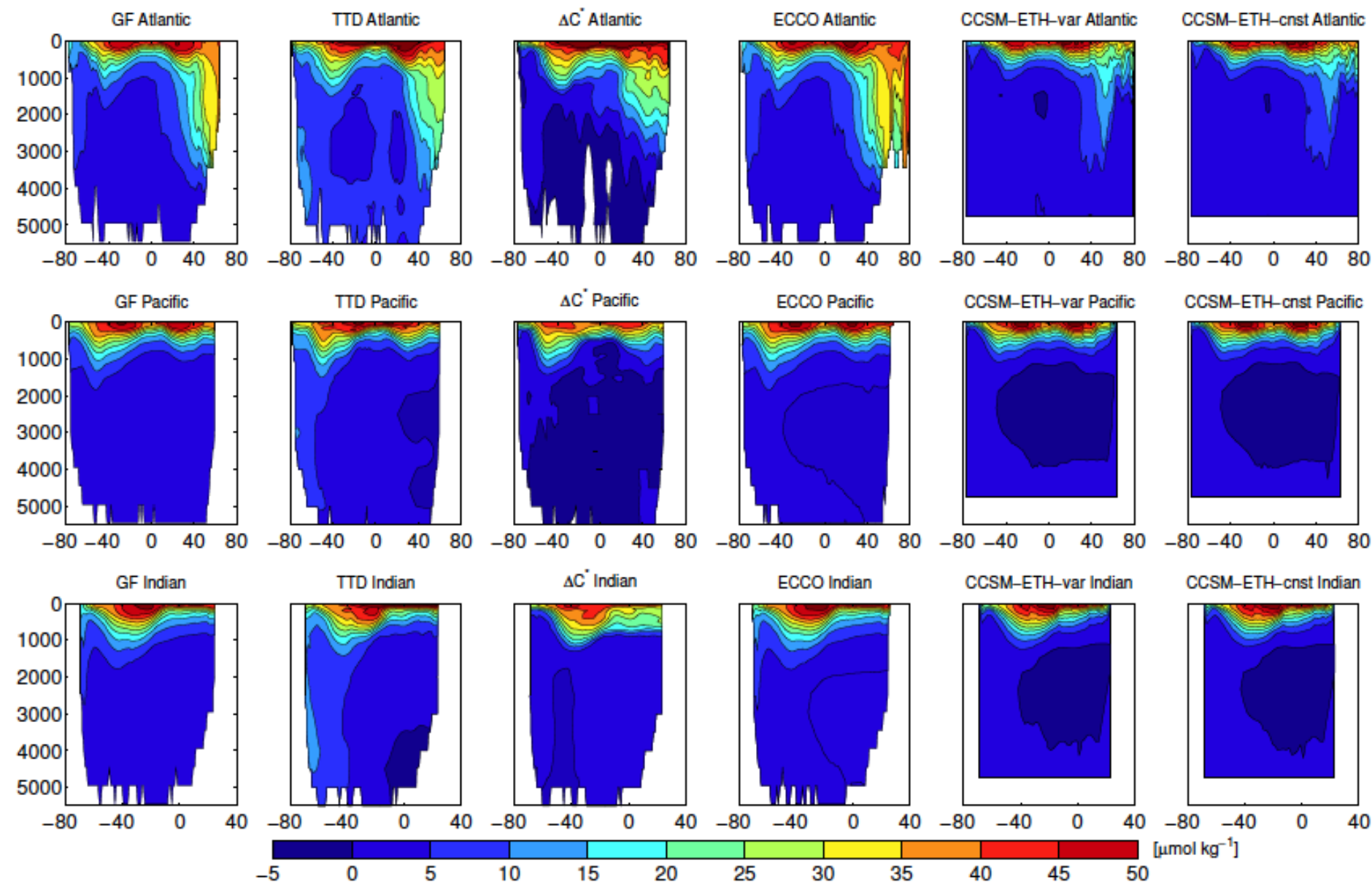
Guiding Questions

- What is the role of AMOC in global biogeochemical cycles, in particular carbon cycles?
- How does AMOC variability affect variability of carbon cycles?
- What are future projections regarding the role of AMOC in the global response to greenhouse warming?

Discussions

- Q1:
 - AMOC is important for mean distribution of carbon in the ocean, particularly in the subpolar North Atlantic
 - Discrepancies between model simulations of mean distribution of carbon, particularly in subpolar North Atlantic and observations, as well as the seasonal cycle
 - Discrepancies are caused mainly by physical processes in climate models, but also due to simulations of biological processes
 - North Atlantic is an excellent place for a focus study of carbon processes in the ocean that requires bringing the two communities together

Anthropogenic C Distribution, 1994



Discussion

- Q2&3:
 - There is observational evidence of large decadal variability in oceanic pCO₂ in the North Atlantic. The decadal variability is stronger than the long-term trend
 - Not clear what drives the large decadal variability, and current observations are not sufficient to link AMOC/AMV variability to carbon variability in the North Atlantic
 - There is a clear need for an enhanced observation
 - Limits in addressing Q2 affects our ability to address Q3

Recommendations

- North Atlantic is an ideal region for physical and biogeochemical communities working together
 - Organize a workshop
 - Focus on some basic processes, such as seasonal cycle
- Enhance carbon observations in the North Atlantic
 - Argo-type floats with biogeochemical sensors
 - Enhance in situ biogeochemical observations
- Improve model simulations
 - CORE-type ocean model simulations with carbon cycle combined with careful diagnostic studies
 - Working with CMIP5 working group on carbon cycle
 - Working towards ocean carbon data assimilation