Do Climate–Carbon Feedback Intensify Over Time?

Objective:

Understand how land and ocean contributions to climate–carbon feedbacks evolve over time from 1850 to 2300.

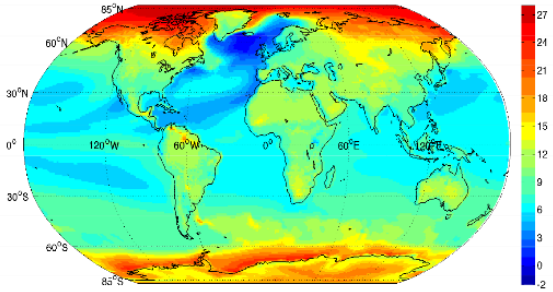
Approach:

- Use CESM1(BGC) to assess carbon cycle dynamics for the Representative Concentration Pathway 8.5 and its extension.
- Three simulations with different levels of radiative coupling allowed us to diagnose parameters describing the gain of the climate–carbon feedback.

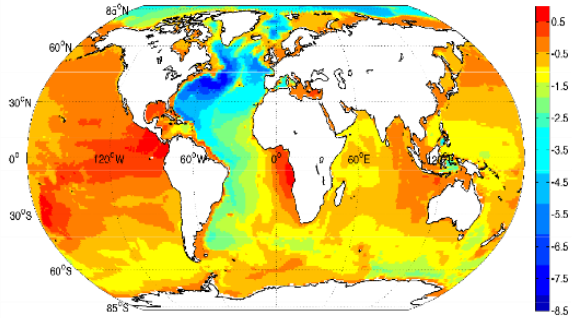
Results/Impacts:

- We found that the gain of the climate–carbon feedback increased almost three-fold from 2100 to 2300.
- Ocean carbon sensitivity to climate change was proportional to increases in heat content.
- Climate influence on carbon was largest in the Atlantic Ocean and in Central and South American forests.

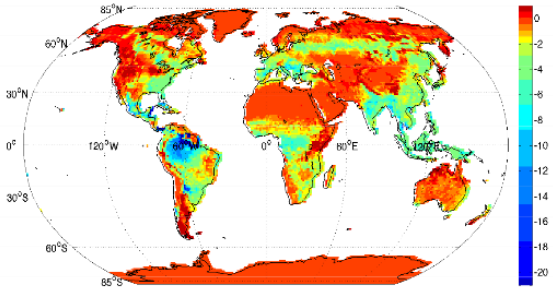
(b) T_{AS}: 2300-1850



(d) ocean carbon: 2300-1850



(f) land carbon: 2300-1850



Randerson, J. T., K. Lindsay, E. Muñoz, **W. Fu**, **J. K. Moore**, **F. M. Hoffman**, N. M. Mahowald, and S. C. Doney (2015), Multicentury Changes in Ocean and Land Contributions to Climate–Carbon Feedbacks, *Global Biogeochem. Cycles*, 29(6):744–759, doi:10.1002/2014GB005079.