Geophysical Research Abstracts
Vol. 21, EGU2019-4501, 2019
EGU General Assembly 2019

Quantifying human-mediated carbon cycle feedbacks

Andrew Jones (1), Katherine Calvin (2), Xiaoying Shi (3), Alan DiVittorio (1), Ben Bond-Lamberty (2), Peter Thornton (3), and William Collins (1)

(1) Lawrence Berkeley National Laboratory, (2) Pacific Northwest National Laboratory, (3) Oak Ridge National Laboratory

Changes in land and ocean carbon storage in response to elevated atmospheric carbon dioxide concentrations and associated climate change, known as the concentration-carbon and climate-carbon feedbacks, are principal controls on the response of the climate system to anthropogenic greenhouse gas emissions¬. Such feedbacks have typically been quantified in the context of natural ecosystems, but land management activities are also responsive to future atmospheric carbon and climate changes. Here we show that inclusion of such human-driven responses within an Earth system model shifts both the terrestrial concentration-carbon and climate-carbon feedbacks toward increased carbon storage. We introduce a conceptual framework for decomposing these changes into separate concentration-landcover, climate-landcover, and landcover-carbon effects, providing a parsimonious means to diagnose sources of variation across numerical models capable of estimating such feedbacks. This work expands the theoretical framework of the Coupled Climate-Carbon Cycle Model Intercomparison Project (C4MIP) to include land use change feedbacks.