AGU Fall Meeting 2018
10 - 14 December 2018
Washington, DC

Oral Presentation
Date/Time: Thursday, 13 December 2018 14:23 - 14:30
Location: Walter E Washington Convention Center - 150A
Presentation URL: https://agu.confex.com/agu/fm18/meetingapp.cgi/Paper/442477

Authors:
David JP Moore University of Arizona
Sarah R Cooley Ocean Conservancy Inc.
Simone R Alin NOAA
David E Butman Yale University
David W Clow USGS Colorado Water Science Center Denver
Nancy H F French Michigan Technological University
Richard A Feely NOAA PMEL
Zackary Johnson Duke University
Gretchen Keppel-Aleks University of Michigan Ann Arbor
Steven E Lohrenz University of Massachusetts Dartmouth
Ilissa Ocko Environmental Defense Fund New York
Elizabeth H Shadwick Virginia Institute of Marine Science
Adrienne J Sutton NOAA Pacific Marine Environmental Laboratory
Christopher S Potter chris.potter@nasa.gov NASA Ames Research Center
Yuki Takatsuka Florida State University
Rita Yu University of Washington Seattle Campus

Title: B43C-09 Biogeochemical Effects of Rising Atmospheric CO2 on Terrestrial and Ocean Systems

Abstract:
Rising carbon dioxide (CO_2) has decreased seawater pH at long-term observing stations around the world, including in the open ocean north of Oahu, Hawai‘i, near Alaska’s Aleutian Islands, the Gulf of Maine shore, and on Gray’s Reef in the southeastern United States. This ocean acidification process has already affected some marine species and altered fundamental ecosystem processes, and further effects are likely. While atmospheric CO rises at approximately the same rate all over the globe, its non-climate effects on land vary depending on climate and dominant species. In terrestrial ecosystems, rising atmospheric CO concentrations are expected to increase plant photosynthesis, growth, and water-use efficiency, though these effects are reduced when nutrients, drought or other factors limit plant growth. Rising CO would likely change carbon storage and influence terrestrial hydrology and biogeochemical cycling, but concomitant effects on vegetation composition and nutrient feedbacks are challenging to predict, making decadal forecasts uncertain. Consequences of rising atmospheric CO are expected to include difficult-to-predict changes in the ecosystem services that terrestrial and ocean systems provide to humans. For instance, ocean acidification resulting from rising CO has decreased the supply of larvae that sustains commercial shellfish production in the northwestern United States. In addition, CO fertilization (increases) plus warming (decreases) are changing terrestrial crop yields. Continued persistence of uptake of carbon by the land and ocean is uncertain. Climate and environmental change create complex feedbacks to the carbon cycle and it is not clear how

feedbacks modulate future effects of rising CO on carbon sinks. These are several mechanisms that could reduce future sink capacity.

Key Words: Biogeochemical, Effects, Atmospheric, CO2, Terrestrial, Ocean, Systems