

# Flood Impacts on Ecosystems in the Midwestern and Southern United States

GSFC scientists used NASA's GEOS model to study the devastating 2019 Midwestern and Southern U.S. floods, estimating effects on land-atmosphere CO<sub>2</sub> exchange and comparing with other recent years. GEOS simulations help to bridge the gap between remotely sensed data and observations at towers, which provide high frequency local measurements of changes in CO<sub>2</sub> concentration that can be used to improve initial estimates of surface CO<sub>2</sub> exchange.

The results show that crops such as corn and soybeans, which are the majority crops of the Midwest, seem to be more susceptible to waterlogging than non-crop vegetation such as savannas, forests, and grasslands. Nearly 20 million acres of farmland went unplanted in 2019 due to the floods, causing billions of dollars in losses for farmers and reduced carbon uptake. In contrast, uptake increased in the Southern U.S. where non-crop vegetation dominates.

Understanding how carbon sinks respond to climate change in the future, including in response to increasingly frequent extreme events, is critical in setting emission reduction targets and improving climate projections. Satellite data and the GEOS model can play important roles in helping to monitor the impact of agricultural systems and to understand the impact of climate extremes in national greenhouse gas budgets, and local communities.

Paper (Nikolay Balashov, et al.)

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