Substantial Carbon Loss Respired from a Corn-Soybean Agroecosystem Highlights the Importance of Careful Management as We Adapt to Climate Change

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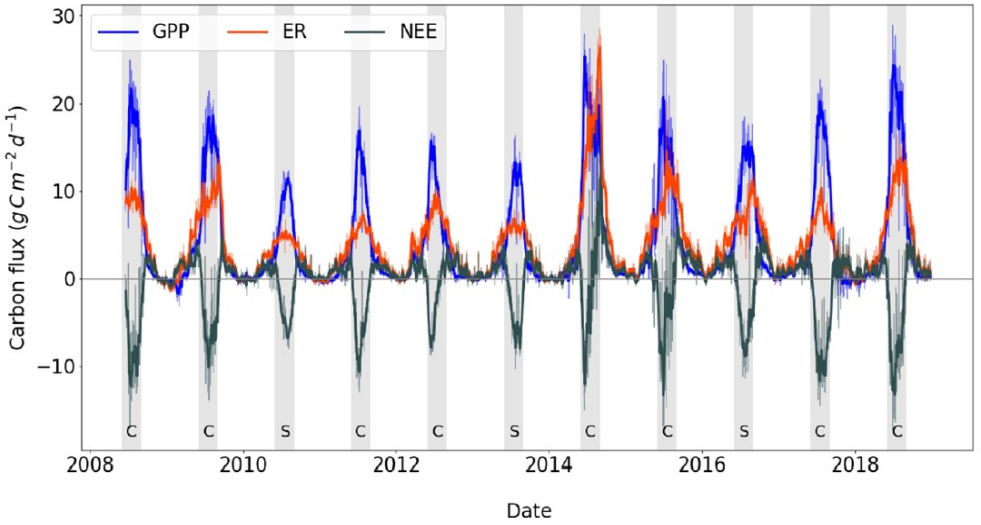
Background/Objective

- Understanding climate change and management impacts on agroecosystem carbon (C) cycles is important for maintaining long-term C storage.
- This study presents an in-depth examination of a 10-year eddy covariance dataset from a corn-corn-soy rotation in the Midwest USA.

Approach

Obtained 10-year (2008-2018) eddy covariance dataset from Ameriflux US-UiC site over corn-corn-soy rotation in central Illinois, USA. Processed eddy flux data to 30-minute averages using EddyPro. Used PyFluxPro to gap-fill data before partitioning net ecosystem exchange (NEE) into gross primary productivity (GPP) and ecosystem respiration (ER).



ER exceeded GPP in 2014 and 2015.

Results

In 2014 and 2015, ER overtook GPP, resulting in net C emission from the agroecosystem. It was hypothesized that higher soil moisture and increased microbial respiration drove increased NEE in those years. However, direct testing of this hypothesis is hampered by a lack of ancillary data.

Significance/Impacts

This work illustrates the climate/land management interaction in driving agroecosystem C balance. Additionally, it demonstrates the importance of long-term paired flux monitoring and core ecosystem measurements for understanding the drivers of ecosystem fluxes and for constraining biogeochemical and life cycle assessment models used to estimate cropping system sustainability.

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