Poster #1-73

Developing New Partitioning Methods for AmeriFlux, to Detect and Account for the Inhibition of Day-Time Ecosystem Respiration

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The global land surface absorbs about a third of anthropogenic emissions each year, due to the difference between two key processes: ecosystem photosynthesis and respiration. Despite the importance of these two processes, direct observations of either are lacking. Eddy-covariance (EC) measurements are widely used as the closest 'quasi-direct' ecosystem-scale observation from which to estimate ecosystem photosynthesis and respiration. Recent research, however, suggests that current partitioning methods may be biased by up to 25%, due to a previously unaccounted-for process: the inhibition of leaf respiration in light. Yet the extent of inhibition at the ecosystem scale remains debated, and impacts on global estimates of photosynthesis and respiration unquantified. Here, we quantify the extent of inhibition of ecosystem respiration across both AmeriFlux and the global FLUXNET EC network, and identify a pervasive influence that varies by season and ecosystem type. We develop new partitioning methods that account for inhibition, and find that diurnal patterns of ecosystem respiration might be markedly different than previously thought. The methods developed will be used to produce the next generation of data products from AmeriFlux and FLUXNET.