The potential to improve the statistical power of eddy covariance ecosystem studies using inexpensive instrumentation.

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Eddy covariance (EC) provides invaluable insights into key biogeoscientific processes. However, despite the many strengths of EC, the explicit use of spatial replication at the ecosystem scale is relatively rare. We argue that inadequate spatial replication limits the statistical power of eddy covariance. Indeed, for a typical ecosystem, $\sim$ four EC towers are needed to have 95% statistical confidence that annual ecosystem fluxes are nonzero. Therefore, by improving the statistical power of eddy covariance studies we have the opportunity to improve the robustness of ecosystem level flux predictions.

In this talk, we will –briefly- make the case for improving EC's statistical power at the ecosystem scale, before then discussing approaches by which this can be achieved. We will end the talk by focusing on one particular solution: an inexpensive CO_2/H_2O EC system we have recently developed. Despite lower accuracy, we argue, that in some circumstances an inexpensive system may be used to effectively and significantly improve the statistical power of EC at the ecosystem scale. We will conclude by highlighting some of the challenges and risks such an approach would incur.