Catalyzing continental-scale carbon cycle science with NEON's first data and software release

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Networks of eddy-covariance (EC) towers such as AmeriFlux, ICOS and NEON are vital for providing the necessary distributed observations to address grand challenges in earth system and carbon cycle science. NEON, once fully operational with 47 tower sites, will represent the largest single-provider EC network globally. Its standardized observation and data processing suite is designed specifically for inter-site comparability and analysis of continental-scale ecological change, including rich contextual data such as airborne remote sensing and in-situ sampling bouts.

First carbon cycle products become available in 2017, including data and software. These products strive to incorporate lessons-learned through collaborations with AmeriFlux, ICOS, LTER and others, to suggest novel systemic solutions, and to synergize ongoing research efforts across science communities. Here, we present an overview of the ongoing product release, alongside efforts to integrate and synergize with existing infrastructures, networks and communities.

Near-real-time carbon cycle observations in "basic" and "expanded", self-describing HDF5 formats become accessible from the NEON Data Portal, including an Application Program Interface. A pilot project is underway to investigate their subsequent ingest into the AmeriFlux processing pipeline, together with inclusion in FLUXNET globally harmonized data releases.

Software for reproducible, extensible and portable data analysis and science operations management also becomes available. This includes the eddy4R family of R-packages underlying the carbon cycle data product generation, together with the ability to directly participate in open development via GitHub version control and Dockerhub image hosting. In addition, templates for science operations management include a web-based field maintenance application and a graphical user interface to simplify problem tracking and resolution along the entire data chain.

We hope that this first release of NEON carbon cycle products can initiate further collaboration and synergies in challenge areas, and would appreciate input and discussion on continued development.