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Environmental Drivers of Ecosystem Carbon Fluxes from Minutes to Years (Version 1.0)

By Christopher Gough, Cindee Giffen, and Thomas W Woodward



Module Description:

In this group lab activity, students build on fundamental concepts of ecosystem production and carbon cycling, combining this knowledge with open long-term data from ecological ([NEON](#) and [FLUXNET](#)) and meteorological ([NOAA](#)) networks to uncover the

environmental drivers of carbon fluxes for an array of different ecosystems. An optional exercise challenges students to develop a simple predictive model from carbon cycling and environmental data.

The following resources are included in this module:

1. Suggested readings and background presentation materials (including slides) to prepare students for the lab exercise
2. Lab activity instructions for students
3. An image-based slide tutorial for instructors and, optionally, students, which can be used during the lab activity as a guide
4. Open carbon flux data for the University of Michigan Biological Station Ameriflux site, US-UMB (<http://ameriflux.lbl.gov/sites/siteinfo/US-UMB>).

Teaching Setting:

This activity assumes fluency in general ecological concepts related to ecosystem production and the carbon cycle. Prior to the group lab activity, instructors may choose to prepare students via lecture material and readings, which are provided in this module package. The first and second sections of the lab activity require 3-4 hours of time and are tailored for introductory biology majors. This activity uses a “predict-observe-explain” pedagogy to help students understand and articulate the patterns of ecosystem productivity at a variety of locations. A third optional exercise is more advanced and is best suited to upper level students and graduate classes.

QUBES Citation:

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Related Materials and Opportunities:

The authors will present a poster describing this resource at the [American Geophysical Union \(AGU\) Fall 2018](#) meeting in Washington, D.C. on December 14, 2018. [View and/or download a draft of the poster here.](#) If you will be attending AGU this fall, you are encouraged to visit their poster to meet the authors and discuss their resource in person.

The authors created this resource while participating in a [National Ecological Observatory Network \(NEON\) Data Education Fellows Faculty Mentoring Network \(FMN\)](#).

NEON is offering another FMN during the Spring 2019 semester for faculty interested in implementing or adapting existing NEON teaching materials to their educational settings. Faculty who already teach using NEON data and would like to use the FMN to improve and transition it to an open educational resource are also invited to participate. More information on NEON educational materials can be found on the [Teaching Resources page](#). Applications are due December 14, 2018. Please visit <https://qubeshub.org/community/groups/neon2018> for additional information and instructions on how to apply.

NEON is one of the collaborating organizations behind the [Environmental Data Science Inclusion Network \(EDSIN\)](#), whose goal is to strengthen initiatives across existing alliances and organizations to recruit and retain individuals from underrepresented groups in data science careers. EDSIN is hosting a conference, [Bringing Conversations on Diversity and Inclusion in Data Science to the Environmental Sciences](#), on April 2-4, 2019 in Boulder, Colorado. Applications for in-person participation is now closed. However, you can participate in the conference remotely. [Find more about remote participation options here.](#)

This resource was nominated for the ROW by a professor at the University of Richmond. If you would like to nominate a QUBES resource for the ROW, please send your nominations to Elia Crisucci at emc22 “at” pitt.edu. It is helpful if you include a short description of why you think the resource should be featured as a ROW.

If you adopt and adapt this module, you are highly encouraged to share your adaptation back with the QUBES community using the QUBES Resources System for sharing Open Education Resources.

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QUBES is a community of math and biology educators who share resources and methods for preparing students to use quantitative approaches to tackle real, complex, biological problems.

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P.O. Box 126, Boyds, MD 20841

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