

## **The AmeriFlux Management Project: Overview**

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**BER Program:** TES

**Project:** AmeriFlux Management Project (lead: LBNL)

**Project Website:** <http://ameriflux.lbl.gov/>

### **Project Abstract:**

AmeriFlux is a network of sites and scientists measuring ecosystem carbon, water, and energy fluxes across the Americas using eddy covariance techniques. The DOE AmeriFlux Management Project (AMP, established 2012) works to enhance the value of AmeriFlux for Earth system modeling, terrestrial ecosystem ecology, remote sensing, and many other fields. As of June 2021, more than 540 sites have joined the AmeriFlux and quality-assured data can be downloaded for nearly 400 of these. These sites represent a wide range of climate and ecological conditions, natural disturbance, and land management. AMP supports operations of 13 core-sites teams (44 sites) to provide high-quality, long-term data; (2) provides technical support and site visits to enable inter-comparison and synthesis of data across sites; (3) quality assesses data and produces standardized data products for basic research, resource-management applications, and Earth system model (ESM) improvement; and (4) holds virtual community meetings and webinars.

Highlights from the past year include: creating a more open data policy, based on CC BY4, with participation of more than half the sites already; releasing a beta FLUXNET product for 63 sites; holding a virtual community meeting with attendees from 32 countries. AmeriFlux BASE (flux/met) data were downloaded by 1,310 users and the new webinar series had cumulative attendance of more than 1200 people and 1500 YouTube views. Finally, in March AmeriFlux launched a new theme year for network action –The Year of Water Fluxes—with broad community engagement and connections to interagency activities.

## **Title: AmeriFlux Community Initiatives - Water Year, FLUXNET, Urban Fluxes, and More!**

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Community collaboration initiatives are at the core of how AMP enables the community to do transformative research. Examples of such initiatives include focal theme years, workshops, webinar and seminar series, annual community meetings and town halls at conferences. Here we describe a subset of recent and planned initiatives focused on supporting the broader AmeriFlux community.

As part of our community collaboration initiatives, we host theme years of focal interest. This year, we launched the Year of Water Fluxes as our next theme year for community action. There are many science opportunities to study water fluxes in AmeriFlux. This theme year will support more water cycle measurements, enhance data quality, and build strong collaborations to work on the various aspects of water and fluxes. Initial activities in the space include a land-atmosphere interactions workshop focused on atmospheric boundary layers and relationships with water and carbon fluxes (June 10/11th) (<https://ameriflux.lbl.gov/community/ameriflux-meetings-workshops/>) and a water focused AmeriFlux Annual Meeting. More activities and opportunities for engagement with the community are planned over the coming year.

This year also saw the launch of a new LBL and community-led project focused on FLUXNET, the global network of eddy-covariance research networks. The central goals of the NSF funded FLUXNET coordination project are to provide novel training and exchange opportunities, develop strong international collaborations, and build tools and protocols that ensure continued collaboration and growth. To do so, the FLUXNET coordination project will develop both data-

focused processing protocols and pipelines, and people-focused education and exchange opportunities. Through the FLUXNET coordination project, we will use creative and transformative approaches to international collaboration and networked science, to build the next generation of FLUXNET to be a self-sustaining flagship of networked global scientific cooperation.

There is a growing interest in using the eddy covariance technique in urban environments. Compared to natural and working lands, there is limited knowledge on using eddy covariance to generate robust estimates of urban land fluxes. We have assembled a working group of 10 experts in urban fluxes to distill applications, challenges, and recommendations for eddy covariance measurements in urban environments. They will also consider how eddy flux could contribute to the proposed Urban Integrated Field Laboratory. The committee, which held its kick-off meeting in April 2021, will produce a brief white paper to share with BER and the AmeriFlux community.

## **Title: New (and Improved!) AmeriFlux Data Products and Services for Earth Science Research**

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The AmeriFlux Management Project (AMP) disseminates standardized flux/met and ancillary data products from 394 AmeriFlux sites. Over 230 sites have elected to release their data under the CC-BY-4.0 data license, also adopted by most sites in FLUXNET2015, which was updated in February 2020. AmeriFlux data distribution under this new license will begin in 2021. An open data policy allows for more streamlined data sharing while still giving attribution to site teams via data DOI citations.

The *AmeriFlux BASE data product* is continuous half-hourly/hourly quality-controlled flux and meteorological (flux/met) data provided by site teams and formatted in the Flux Processing (FP) global standard. Data for each site is assigned a DOI. Data users can search over 2,600 site-years of BASE data by 133 variables spanning 30 years (1991-2021) on the AmeriFlux website. Supporting Biological, Ancillary, Disturbance, and Metadata (BADM) are also available and contain site characteristics (e.g., latitude / longitude, vegetation and climate classification), variable information (e.g., height / depth, instrument model), and ecological data collected at the site (e.g., canopy height, LAI, soil characteristics). New online documentation describes available BADM groups and variables (<https://ameriflux.lbl.gov/data/badm/badm-standards/>).

The *FLUXNET data product*, which is compatible with the FLUXNET2015 dataset, is generated with the ONEFlux processing codes that gap-fill, partition fluxes, and perform uncertainty

analysis. An evaluation version of the data product is available for over 60 sites. AMP has integrated ONEFlux into the AmeriFlux data processing pipelines as described on new webpages (<https://ameriflux.lbl.gov/data/data-processing-pipelines/>). The production release of the FLUXNET data product for over 20 AmeriFlux sites is scheduled for September 2021.

AMP also provides data services targeted for Earth science researchers. To support the new CC-BY-4.0 license and upcoming production FLUXNET data release, we have revamped the data-related pages on the AmeriFlux website. Data users can more easily discover and select data by variables, years, data-sharing policy, data product, and site characteristics on the Site Search page. The Data Download page has been retooled to enable multiple ways to select sites' data for download. The Site Sets functionality provides a way for registered users to create groups of sites that are used regularly. Citations and Site PI information can be downloaded easily for any Site Set. Finally, a customizable mapping feature allows data users to easily create maps of sites of interest.