The AmeriFlux Network

Celebrating its 20th Anniversary Year!

Watching the terrestrial biosphere breathe

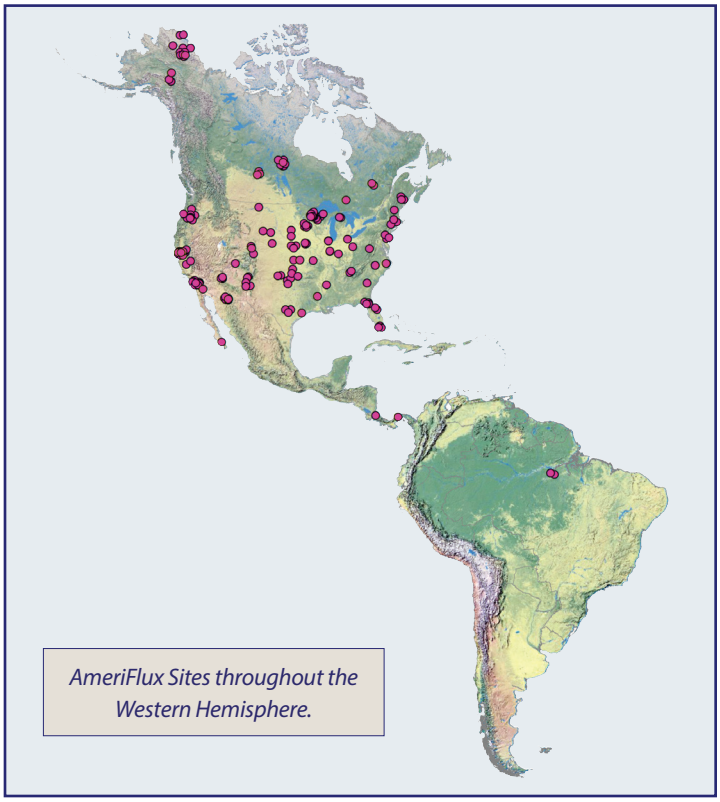
ameriflux.lbl.gov

The largest flows of carbon between land and atmosphere come from terrestrial ecosystem photosynthesis and respiration. They have profound impacts on atmospheric composition and climate. Across the Americas, independent scientists measure these flows at more than 120 sites, using a technique called eddy covariance. Some sites are strategically clustered to focus on ecosystem response to climate change over gradients of elevation or rainfall. Some sites observe how land-use and agricultural practices affect carbon, water and energy fluxes.

By collecting, processing, and sharing the data of all these scientists, the AmeriFlux Network provides a platform for research that spans the full spectrum of ecosystems and climates, from Amazonian rainforests to the North Slope of Alaska. The scientific community uses these measurements to assess responses and feedbacks of terrestrial ecosystems to the environment, including changes in climate, land use, and extreme events such as droughts, storms, or wildfire. AmeriFlux data sets help scientists to examine crucial linkages between ecosystem processes and climate responses. Knowledge gained from this network leads to improved understanding of important ecosystem processes and climate prediction, as well as advances our foundational understanding of the Earth system to inform future energy and resource decisions.

The AmeriFlux network started in 1996 with early support coming from DOE, NASA, NOAA and the U.S. Forest Service. Starting with 15 sites in 1997, the network has grown to over 120 active sites in 2016—with more than 70 sites joining the network since 2012. The longest-running site, Harvard Forest (Massachusetts, USA), has been measuring carbon fluxes since 1990, and several sites have operated continuously for more than 10 years.

As a grassroots, investigator-driven network, the AmeriFlux community tailors instrumentation to suit each unique ecosystem. This "coalition of the willing" is diverse in its interests, use of technologies and collaborative approaches.



AmeriFlux Sites throughout the Western Hemisphere.

The Chimney Park flux tower is in a subalpine conifer forest in Wyoming's high mountains. An AmeriFlux Management Project member climbs the tower during the 2014 QA/QC site visit.

AmeriFlux Science Goals

- Quantify sources and sinks for terrestrial ecosystem carbon, and how they are influenced by disturbance, land use, climate, nutrients, and pollutants
- Understand processes associated with photosynthesis, respiration, and carbon storage in ecosystems
- Collect observations that promote understanding and modeling of the current global carbon budget
- Enable improved predictions of future atmospheric carbon concentrations

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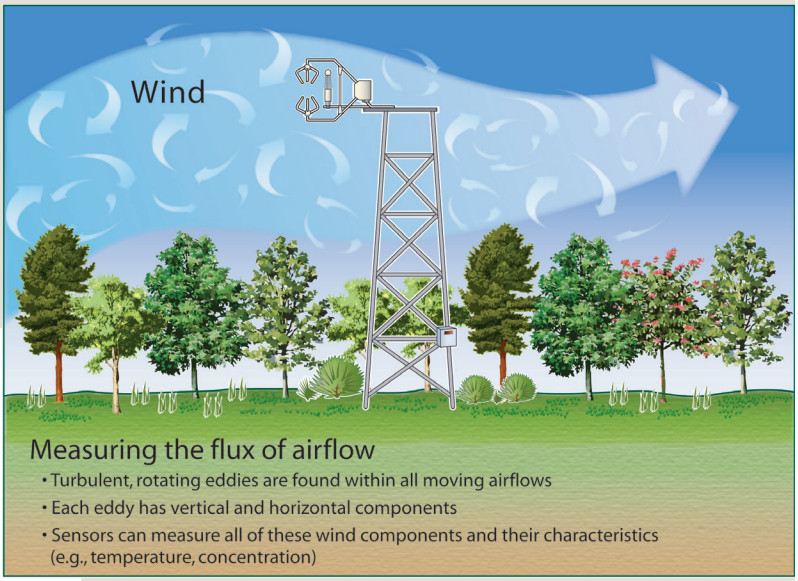
Eddy Covariance Method to Measure Flux.

The eddy covariance method derives fluxes of carbon, water, and energy between the vegetation and soil and the atmosphere. This method measures the velocity of air drafts as they move up and down, and the instantaneous concentration of trace gases in those drafts. At AmeriFlux sites, these fluxes are measured directly, continuously, and over large areas, without disrupting the systems being studied. With advances in computational capability and instruments that measure wind turbulence and fluctuations of trace gases quickly and reliably, use of the eddy covariance method has expanded worldwide.



The AmeriFlux Management Project (AMP)

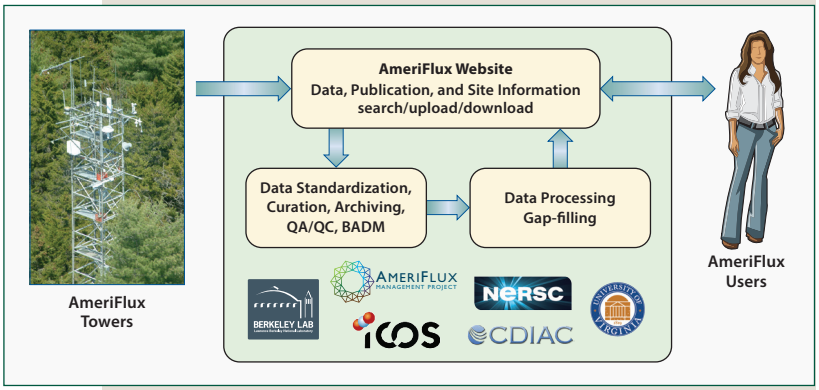
In 2012 DOE established the AmeriFlux Management Project (AMP) at Lawrence Berkeley National Laboratory (LBNL) to support the broad AmeriFlux community and the AmeriFlux sites. AMP collaborates with AmeriFlux scientists and sites to ensure the quality and availability of the continuous, long-term ecosystem measurements necessary to understand these ecosystems and to build effective models and multisite syntheses.

To assure that data from this network of independent sites are comparable and consistent, AMP deploys a technical team with its specialized mobile flux instrumentation to visit Ameriflux sites each summer, and works with site investigators to verify the quality of their data. AMP works with the scientific community to:

- Enhance observations of ecosystem fluxes at all AmeriFlux sites, with direct operational support to selected sites to assure long-term, high quality data
- Ensure the accuracy of AmeriFlux measurements through site visits with portable eddy covariance systems, regular calibrations, and data quality checks
- Enable scientists to quantify the effects of disturbances (e.g., wildfire) with portable rapid response systems
- Provide open-access data that are consistent, standardized, and tailored to user needs
- Strengthen the AmeriFlux community and its junior scientists through annual principal investigator meetings, data workshops, and hands-on training
- Evaluate and use innovative instrumentation and measurement methods
- Promote best safety practices at AmeriFlux sites

Data Flows. Data are uploaded, checked for quality, and archived. After validation, data are freely and publicly available to the global scientific community. AmeriFlux works with other flux networks around the world to standardize data sets and create value-added data products so that researchers can more easily compare across continents and improve Earth System Models.

The AmeriFlux data management system has been long supported by DOE at Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory. The AMP at LBNL provides new, value-added data products to the community. The AMP and CDIAC offer easy access to data sets and ancillary data, with continuing enhancements for data discovery, synthesis, collaborative research, and long term archiving.



DOE Websites

U.S. Department of Energy (*energy.gov*)

DOE Office of Science (*science.energy.gov*)

DOE Office of Biological and Environmental Research (*science.energy.gov/ber/*)

Climate and Environmental Sciences Division (*science.energy.gov/ber/research/cesd/*)

Terrestrial Ecosystem Science (*tes.science.energy.gov*)

AmeriFlux Network (*ameriflux.lbl.gov*)

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