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FLUXNET: an unique dataset for water and carbon cycle understanding and models development and validation

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The FLUXNET network is providing direct measurements on the 'breathing of the terrestrial biosphere'. The CO2, water and energy exchange between the terrestrial biosphere and the atmosphere measured at the eddy covariance sites is giving us insights on how ecosystem metabolism to climatic perturbations and disturbances across a spectrum of time scales and different ecosystem and climate regimes. FLUXNET data are critical for validating and improving the next generation of mechanistic models, that are being used to compute coupled climate-ecosystem interactions and biogeochemical cycling of carbon and water.
The current FLUXNET database (www.fluxdata.org) assembles data from more than 250 sites, encompassing all major biomes of the world and being processed in a standardized way. This unique dataset provides copious amounts of information about the fluxes characteristics and their responses to climate and disturbances. The methods available to estimate from Net Ecosystem Production (NEP) the two main components Gross Primary Production (GPP) and Total Ecosystem Respiration (TER) give possibilities to analyze the relations between these three quantities and their link to climate variables like temperature and precipitation and to disturbances, while the water fluxes permit to look at the water/carbon cycles interactions. At the same time the long time-series available for many sites (up to 14 years) offer the opportunity to analyze the interannual variability of fluxes and the effect of extreme climate conditions. In this talk the FLUXNET dataset will be presented, including their uncertainty, highlighting how these measurements can help the process model development and validation and how the data can be accessed and used.