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Linking plat traits at ecosystem scale to ecosystem functions as observed by eddy covariance measurements

Talie Sadat Musavi (1), Jens Kattge (1), Miguel Mahecha (1), Markus Reichstein (1), Marjan Van de Weg (2), Peter Van Bodegom (2), and Michael Bahn (3)

(1) Max-Planck-Institute for Biogeochemistry, Jena, Germany, (2) Vrije Universiteit Amsterdam, Amsterdam, Netherlands, (3) Institute of Ecology, University of Innsbruck, Innsbruck, Austria

In this study we analyze the correlation structure among plant traits, ecosystem functional properties, characteristics of climate, soil and vegetation at 253 FLUXNET sites. This correlation structure may provide a basis for assessing vegetation functioning and its vulnerability under climate change.
Until now, analyses of the FLUXNET dataset have shown that much of the observed spatial and temporal variation of ecosystem fluxes can be explained and scaled by information on soil, climate and vegetation structure, without considering the variation in the functional characteristics of the vegetation occurring at the FLUXNET sites. Instead, these studies have used plant functional types (PFT) as a parameter representing the vegetation influence on fluxes.
However, provided the variability in traits that exists within an individual PFT at different sites, we analyze in this study how traits additionally influence ecosystem functional properties.
We use community mean trait values to understand how vegetation characteristics relate to ecosystem functional properties, like maximum GPP at light saturation, or photosynthetic water use efficiency. These functional properties are derived from the combination of ecosystem level flux observation and information of spatial meteorology and vegetation remote sensing covariates. In addition, we investigate whether vegetation characteristics have an influence on ecosystem fluxes when combined with climate and soil information.
So far analyses of this kind were impossible due to a lack of plant trait information. But the plant trait dataset TRY has been growing for years and in combination with novel methods in machine learning. We now have the opportunity to predict plant trait values for individual sites.
We will present first results focusing on the relationship of ecosystem functional properties to leaf traits like specific leaf area and leaf carbon, nitrogen and phosphorus concentration scaled to canopy level.