Use of FLUXNET data product to evaluate productivity metrics derived from satellite remote sensing

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Motivation:

Satellite data are increasingly being used to monitoring the primary productivity of terrestrial ecosystem. To be scientifically useful, spatial and temporal patterns in satellite data based estimates of primary productivity need to be constantly evaluated with *in situ* measurements. FLUXNET data offer a unique opportunity to undertake this task, at a spatial scale that is commensurate with the size of satellite pixels (i.e., the tower "footprint" and satellite pixels both integrate over several hundred meters) and at a range of time scales (e.g., daily and annual productivity integrals, as well as seasonal dynamics).

Methods:

In this study we propose to assess the comparative suitability of several different metrics, obtained from Moderate Resolution Imaging Spectroradiometer (MODIS) data, for monitoring the spatial and temporal variations ecosystem productivity.

We plan to examine the correlation between the metrics derived from MODIS data (including NDVI and EVI integrals, as well as the MOD17 GPP product) and tower-derived GEP (gross ecosystem productivity) and NEE (net ecosystem exchange) integrals at daily, multi-day, and annual time scales, with a specific focus on the annual time scale. Our primary goal is to quantify the degree to which satellite products accurately represent both spatial (across sites) and temporal (in terms of interannual variability) in ecosystem productivity.

Anticipated Results:

Building on the earlier analysis by Heinsch et al. (2006), the results from our study will provide an assessment of the accuracy of the information retrieved from MODIS, and will contribute to improving algorithms to estimate productivity from remotely-sensed data.

Data:

We will use FLUXNET data from 2000 to the present, corresponding to the availability of MODIS data products. We request access to the whole LaThuile data set for this analysis.

Because of our interest in the interannual patterns, we will use only sites for which 5 or more years of data are available. We will focus primarily on data from forested (both conifer and deciduous) and grassland sites in temperate and boreal regions (i.e., sites with a pronounced "summer active" and "winter dormant" period). Data from other ecosystems with strong seasonal cycles may also be analyzed, provided that enough site-years of high-quality data are available.

Authorship policy:

All data contributors making an intellectual contribution will be included as named coauthors. Data contributors not making an intellectual contribution will be included as group coauthors in the author list, if possible with the journal (i.e., "and the FLUXNET Synthesis Group"). Group coauthors will be identified by name in the acknowledgements. We will circulate a summary of initial findings to all data providers, and solicit feedback; this will be followed by a draft manuscript, which we will also circulate for feedback. Data providers who have contributed intellectually and will be included as coauthors will be sent the final version of the manuscript prior to journal submission.

References:

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