

Proposal for Opened Access FLUXNET Data Synthesis Research

Title: Linking satellite observed trends in boreal NDVI to declines in vegetation productivity using field observations and an ecosystem process model.

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Background:

Recent satellite observed trends suggest declining boreal forest productivity (Goetz et al, 2005; Bunn and Goetz, 2006). This apparent ‘browning’ of boreal forests represents a departure from previously reported greening trends (Myneni et al, 1997) and is likely indicative of hydraulic stress as a result of increases in temperature and vapor pressure deficit associated to climate change (Goetz et al. 2007, Zhang et al. 2008). The aim of our study is to combine satellite observations, tree ring data, and simulations of ecosystem carbon exchange validated with flux tower observations to simultaneously; (1) assess declines in boreal productivity, (2) elucidate the mechanisms responsible for observed trends, (3) quantify the associated changes in ecosystem carbon exchange.

Objectives and Analyses:

Our proposed study seeks to quantify and assess times series analyses of NDVI with data on ecosystem carbon exchange derived from tree ring data sets and biogeochemistry model simulations. We have acquired and processed most of the available satellite and tree ring data. Thus, this proposal focuses primarily on the modeling portion of our study. The satellite observed trends will rely on AVHRR and MODIS data sets acquired between 1981 and 2009.

We will use the BIOME-BGC process model to simulate annual net ecosystem carbon exchange (NEE) with tree ring data, and to compare simulated trends in NEE with NDVI trends. Flux tower observations of NEE are necessary for purposes of model validation. In cases where extensive flux records exist (5~10) years we may use tower observations as an additional tool to evaluate trends directly.

Sites Involved:

We are interested in flux observations from towers located in the North American and Eurasian boreal regions. Based upon availability of suitable satellite observations and in situ data we have identified the following sites to be most appropriate; CA–Oas, CA-Obs, RU-Zot, RU-Fyo, SE-Sk, RU-Yak, Se-Kno, US-Bn.

Co-authorship policy:

Our policy will be to provide co-authorship to those who made a significant intellectual contribution to the article. Those responsible for collecting and providing the data used in the proposed analyses will be acknowledged.

References:

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