Biogeosciences Discuss., 7, C1218–C1220, 2010
www.biogeosciences-discuss.net/7/C1218/2010/

Biogeosciences Discussions

Interactive comment on "A geostatistical synthesis study of factors affecting gross primary productivity in various ecosystems of North America" *by* V. Yadav et al.

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Received and published: 31 May 2010

The authors thank the reviewer for their thoughtful suggestions to improve the quality of the manuscript. Responses to individual comments are included below. (Original referee comments are in italicized text.)

General Comments

Numerical predictions of vegetation dynamics are highly uncertain at larger spatial and longer temporal scales. The authors developed a statistical model to understand how

the importance of specific covariates changes with temporal resolutions. The work conducted in this paper may contribute to improve the representations of process based terrestrial ecosystem models in terms of their ability to estimate GPP at different time scales. A shortcoming of this work is that historical ecosystem alterations (e.g., land-use change, nitrogen deposition, and CO2 fertilization) remain unconsidered in the model.

It is true that the statistical model developed as part of this study did not incorporate land use change, nitrogen deposition, and CO2 fertilization. However, the primary focus of this study was to examine the empirical relationship between GPP and auxiliary environmental variables collected at flux tower sites for years 2001-2007. It is unlikely that historical ecosystem alterations would have any significant impact in determining the variability of GPP at the examined flux sites at daily to monthly scale, especially when the study sites have not seen any land use change in the decade preceding the examined time period. Furthermore the data on land use change, nitrogen deposition and CO2 fertilization were not available for the examined time for flux sites considered in this research.

We agree with the reviewer that including such variables would be important in explaining longer-term variability in the observed flux history.

The issue of low-frequency modes may need to be addressed in modeling

Assuming that by "low-frequency modes" the reviewer is referring to the impact of processes that operate on long temporal scales (e.g. disturbance, ENSO, climate variability, etc.), we agree that including such information would be important for longer-term studies, but we would be unlikely to correctly identify the impact of these modes using only a 7 year record, as was used in this analysis. This time period was selected based on data availability limitations across the examined sites, and the desire to include a similar number of years in the analysis for each site.

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Interactive Comment

Specific Comments

p.1466, l.10: Although the references are listed here, it would be helpful for the reader if you summarize how earlier studies related the variables examined in this work to GPP in introduction. This may help to explain why the data used in this study were selected.

Thank you, we have incorporated details on how earlier studies related the variables examined in this work to GPP in the introduction of the revised manuscript.

Technical Corrections

Gross primary productivity and auxiliary environmental data p.1452, l.6: It is appropriate to add the reference for MODIS LAI and FPAR products (MOD15).

Agreed. We have incorporated these references in the revised manuscript.

BGD

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