

## ***Interactive comment on “Terrestrial carbon sinks in the Brazilian Amazon and Cerrado region predicted from MODIS satellite data and ecosystem modeling” by C. Potter et al.***

### **Anonymous Referee #1**

Received and published: 28 March 2009

**General comments** This paper presents a model-based exploration and prediction of interannual variability in the carbon balance of Brazilian Amazonia. Its novelty comes from the use of satellite data as inputs into a model to map spatial and interannual variation in carbon sources and sinks. This is a useful exercise, but the paper fails to conduct a systematic exploration and critical evaluation of the drivers of these spatial and interannual patterns. It also overstates the agreement of NPP values with the field evidence. The failure to conduct a systematic analysis of its own predictions is its greatest weakness.

**Specific comments** Page 955 As the model is constructed (or at least explained in the

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text), long term  $R_h$  is equal to NPP (what goes in eventually goes out). Therefore it is the estimation of NPP that is ultimately the measure to be evaluated; it makes little sense to focus on the close agreement to  $R_h$  that happens to exist over the measurement period.

As explained in the paper, it appears there is no scope for CO<sub>2</sub> fertilisation of NPP in the model formulation, i.e. an long term shifts in NPP can only be driven by climate shifts. This is fine if correct, but should be explicitly stated,

A recent review of multiple field data from three LBA sites, including the data mentioned in this paper, (Malhi et al, published early online in *Global Change Biology*) suggests that the NPP at Tapajos is 1440±130 g C m<sup>-2</sup> and at Manaus is 1010±140 g C m<sup>-2</sup>. This would suggest that CASA actually underestimates NPP. Model-data agreement on NPP should not be overstated

However, over or underestimation on NPP does not matter that much when calculating NEP as formulated in this paper; this is driven in any year by estimated disequilibrium between the immediate NPP, and the  $R_h$ , which is a lagged and function of previous years' NPP

The most useful contribution of this paper is the exploration and spatial mapping of interannual variation in sources and sinks. Yet there is little mechanistic exploration of what is driving these spatial and temporal patterns in the results, only post-hoc speculation. Is it light availability, drought stress, apparent greenness, temperature fluctuation? Surely a systematic analysis (varying one input while keeping others in a mean seasonal cycle) could tease these factors apart in a concrete way. These would generate direct hypotheses on drivers of interannual variability in carbon balance that could potentially be evaluated with field data. In its current state the paper does a poor job of exploring this interannual variability

Figure 2 is NEP, not NPP as the caption states

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Page 949, line 13 Is there a reference for this?

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**BGD**

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