

General comments and overall evaluation:

It's a good method for using CO₂, NPP, and AGB data in CO₂ flux data assimilation. Especially, NPP and AGB are new information for CO₂ flux assimilation. However, it's not clear about how to use these data in the assimilation cycle. Is it effective for using these three different data? What about the results using one or two?

The monthly mean CO₂ variability detrended by a smooth fit was used in this study. How to compute the detrended results from the CO₂ concentrations based on the transport model? Which parameters are optimized when CO₂ data are used?

The mean AGB/NPP values were used in this study. What is the mean value? monthly? yearly? How many times are used in the assimilation cycle? Which parameters are optimized when AGB/NPP values are used? What about the standard deviations and uncertainty? How to compute mean AGB/NPP values based on the terrestrial biosphere model?

Minor comments:

Page 2, Line 1: What's the difference between the results using CO₂, NPP, AGB and only CO₂?

Page 5, Line 10: Could you explain AGB in this section? How to compute AGB?

Page 9, Line 23: How to process the all observation data? More details about the assimilation cycle.

Page 10, Line 21: How to compute chi² for atmospheric CO₂, AGB, NPP?

Page 11, Line 28: What's the mean? Is it the mean of all years? Are these data used only once in the assimilation cycle?

Page 12, Line 18: large chi² also means the designed uncertainty is too small?(Page 10, Line 22)

Page 14, Line 6: How to compute the detrended CO₂ variability based on the modeling results?

Page 17, Line 8: AGB

Page 18, Line 1: AGB

Page 19, Line 16-18: What's the prior value? What's the post value for only CO₂?