

Interactive comment on “Asymmetry and uncertainties in biogeophysical climate–vegetation feedback over a range of CO₂ forcings” by M. Willeit et al.

G. Bala (Referee)

gbala@caos.iisc.ernet.in

Received and published: 18 September 2013

Review of “Asymmetry and uncertainties in biogeophysical climate–vegetation feedback over a range of CO₂ forcings” by M. Willeit, A. Ganopolski, and G. Feulner

This study quantifies the dynamic vegetation feedback factor and compares it with other fast feedbacks such as water vapour and cloud feedbacks. It also quantifies the changes in climate due to CO₂ physiological effect and fertilization (LAI changes). It should be admitted that many studies in the past (such as Sellers et al. 1996, Levis et al. 2000, Betts et al. 1997) have also performed similar simulations and quantified the various direct CO₂ effects. What is unique to this study is its ensemble approach to the

C5135

same problem which provides uncertainty estimates in a single modelling framework. This study would be useful addition to the literature on direct CO₂ effects and dynamic vegetation feedback. The presentation is very good and the work is comprehensive and detailed. I recommend publication after the following minor comments are addressed.

1. Page 12969, Line 15 and Page 12970, Line 1: These are good places to cite the work by Bala et al. (2007 PNAS) which pointed out the location-specific effects of large scale deforestation using a comprehensive climate-carbon model.
2. Page 12972, Lines 25-26: Bala et al. (2006) obtain a global mean value of 0.65 and land mean value of 1.4K when all vegetation feedbacks related to direct effect of CO₂ is considered. This could be cited here for comparison.
3. Page 12980, Line 4: “cover” should be “type”?
4. Page 12981: Fig. 6 is discussed before discussing Fig. 5. The authors should consider rearranging the figures.
5. Page 12983, Lines 10-12: It would be good to cite Bala et al. (2006) here.
6. Page 12985, Line 2: “Fig. 8b” should be “Fig. 9b”?
7. Page 12985, Lines 20-29: The present discussion is incorrect. Since the correlation between T and E, and T and albedo both are negative, positive correlations should be unphysical. Accordingly, “negative” should be changed to “positive” on line 25. Further, I believe the sign of the correlation between and E should be changed before the summation.
8. Page 12987, Line 2, “less” should be “more”?
9. Page 12988, Line 10: Change “global temperature” to “global mean temperature”
10. Page 12988, Line 26, second word: “vegetation” should be “vegetation feedback”
11. “Fig. 6c” is not at all discussed in the paper. You can remove it.

C5136

12. There should be significance testing in Fig. 3, 4, and 7

Best wishes, Bala

Interactive comment on Biogeosciences Discuss., 10, 12967, 2013.

C5137