

Interactive comment on “Competing roles of rising CO₂ and climate change in the contemporary European carbon balance” by R. Harrison and C. Jones

Anonymous Referee #1

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Comments on the manuscript by Harrison and Jones ?Competing roles of rising CO₂ and climate change in the contemporary European carbon balances?

In this manuscript, the authors simulated carbon balance of European terrestrial ecosystems from 1948 to 2005 using a model JULES and regional climate data. They focused on the opposite responses to atmospheric CO₂ increase and climate change, and found that elevated CO₂ would be responsible to the contemporary net carbon sink, offsetting the source by climate change.

The research theme of climatic feedback is timely for considering the global warming issue and ecosystem management. Although a couple of studies have obtained similar

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consequence (i.e. source by climate change and sink by elevated CO₂, competitively), this study adds a spatially explicit result with a new model JULES. As stated by the authors, land-use impacts should be included in their forthcoming research.

The manuscript is concise and well organized. However, this manuscript does not describe how JULES was validated (except for the hydrology using GSWP2 in Discussion). As many flux measurement data are available in Europe, it is possible and necessary to make comparison between flux observation and JULES output.

Specific comments Page 2386 Abstract Line 8 Provide the period for the net increase of around 150 Tg C yr⁻¹.

Page 2387 Line 9 A recent paper (Stephens et al. 2007: Science 316, 1732-1735) implies that northern carbon sink is weaker and tropical sink is stronger than expected.

Page 2389 Line 1 If JULES includes TRIFFID DGVM, biome re-distribution occurred in the model simulation from 1948 to 2005. It is correct?

Page 2389 Line 2 Which spatial resolution was adopted in this study?

Page 2389 Lines 10-18 Does JULES include response mechanisms to elevated CO₂ such as stomatal closure and enzymatic photosynthesis enhancement? If so, describing the model responsiveness may help readers to interpret the results (e.g., Page 2394 Line 1).

Page 2390 Line 6 In Figure 1, anomaly in 2003 is not evident. Correct? Then, why?

Page 2393 Lines 7-9 The difference in sinks among the sub-regions is, at least partly, due to the different in land area. Area-average strength may be clearer.

Page 2394 Line 11 Why increased productivity did not result in biomass increment?

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