

## ***Interactive comment on “Re-evaluating the 1940s CO<sub>2</sub> plateau” by Ana Bastos et al.***

**Anonymous Referee #2**

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The study analyses the causes of the 1940s atmospheric CO<sub>2</sub> flattening measured in ice core bubbles from Law Dome (East Antarctica). The CO<sub>2</sub> plateau during the 1940-1950 decade is one of the significant (and still unexplained) features of the carbon cycle over the last centuries and millennia. Coupled Climate Carbon Cycles Models would benefit from an understanding of the causes of the 1940s CO<sub>2</sub> flattening, as they are likely to improve their accuracy in estimating future climate-carbon cycle changes. The subject of the paper is thus very relevant for biogeochemical investigations and fits within the scope of the journal. There are two novel aspects: 1) combining informations from a number of different studies (investigating fossil fuel and land use change CO<sub>2</sub> emissions, as well as ocean and land CO<sub>2</sub> sequestration) in a comprehensive, review-like type of study of the causes of the 1940s CO<sub>2</sub> plateau; 2) using the OSCAR model to explore whether land use changes could have led to a significant land sink. Even though the reasons of the 1940s CO<sub>2</sub> plateau remain elusive, the conclusions reached are significant as the authors explain that the ocean

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sink alone cannot provide the complete explanation, and a strong contribution from the land sink is needed. I found the approach used by Bastos et al. comprehensive and clear. All calculations use state-of-the-art models and valid assumptions. The results are supportive of the conclusions. Nevertheless, I would have liked the authors to be more critical with the estimate of fossil fuel emissions, which they assume are accurate within the given uncertainties. Is it possible that the estimates provided by the CDIAC are biased? The description of calculations are complete and precise to allow their reproduction. The language and the presentation are clear. However, I have reported several specific comments to improve the paper in the attachment.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/bg-2016-171/bg-2016-171-RC2-supplement.pdf>

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