

Interactive comment on “The contribution of land-use change versus climate variability to the 1940s CO₂ plateau: Former Soviet Union as a test case” by Ana Bastos et al.

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- The topic of the absence of CO₂ increase in the 40ties is very relevant and still unclear. - The suggested 2 hypotheses: WWII and warm climate in this period are good and very interesting. - The Authors prepared a lot of materials reconstructing land cover and land use in the 40ties in the Former Soviet Union (FSU). There is not a lot of official (and probably not a lot of unofficial) materials about this time. Therefore, every additional data and opening of the data for broad communities are strong contribution to the retrospection and window to this difficult time. - The Authors made detailed analyses and modeling of the contributions of WWII and warming climate at this period

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to the CO₂ plateau.

I also looked on the comments of Anna Romanovskaya, anonymous Reviewer and the response of the Authors. As common, both reviewers mentioned some shortcomings and unclear points in the text and in the study. In my view, the Authors carefully responded to the Reviewers and probably will improve the paper for the next version.

Because of these reasons, I am sure that the paper should be published and surely will attract not only scientific but also general interests.

I should state – that I cannot evaluate the quality and the depth of modeling made by the Authors with ORCHIDEE, because this is not my expertise. However, 1) the obtained modeling results are very plausible comparing with C sequestration rates in soil and vegetation in abandoned land obtained experimentally in regions with similar climate and soils; and 2) Some of the Authors have excellent scientific records – so, I have no doubt that they have done and supervised the study on a very high level.

Suggestions (at least for Discussion) P3 L13 (here and in the main text too): 26.6 Mio are mentioned as killed during the WWII. This is not the only the reason for decreasing population density. I think the other very relevant reason should be mentioned: the victims of the repressions during the Stalin time (at least before WWII). To the directly killed ~ 1 Mio people in the late 30ties, some millions (10 Mio-?) were departed from the west parts of the SU to the east and to the north and were spaced out from agriculture. This also led to the decrease of agricultural area and productivity. P6 L30 ... both scenarios are not clear. Explain with more details. P8 L7 What about the specially organized famine 1932/33? 6-7 Mio people (mainly in the west regions of SU) died in this period, and surely this led to the decrease of agricultural land area. This decrease is surely not reflected in the official land area statistics – because of various reasons, also because such area decrease is distributed very punctual and hardly to assess. I will not focus the paper on the political or social directions, but these huge losses of population (mainly in rural areas) surely led to consequences in subsequent

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agriculture, including crop productivity and area.

There is another general point, which was not considered by the authors – It is the dynamics of C accumulation in vegetation and soil after the abandonment. In the first years (3-5-7 years, depending on the climatic zone) after the abandonment, the C stocks in soil decrease (not increase). This is connected with the time necessary for the establishing on natural zonal vegetation. (This was also indirectly mentioned by the anonymous Reviewer on page C4 in the middle). This establishment and succession takes much longer compared to the fast development of the annual sowed agricultural crops. Therefore, the compensation and overcompensation of soil organic matter losses as CO₂ by plant C input into the soil and stabilization takes years and decades. Therefore – and this is my opinion (and not the modeling), the reasons mentioned above related to Stalin repressions in the late 30ties and to the organized famine 1932/33 may have even stronger effects than the actual cropland area losses during WWII. For the warming hypothesis: P10 L8. . . The Authors compare the annual temperature and state that the 0.5 °C increase above the mean will lead to the strong CO₂ uptake by boreal and temperate forests in the latitudes above 45 °N. It is important that the annual temperature changes may not be really relevant, because e.g. the increase in the winter temperature of 1 °C will have not any effects on the CO₂ uptake. Therefore, the Authors should focus more (or at least present) the increase of the spring and summer temperatures, as well as on the prolongation of the vegetation period.

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