

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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Comments to MS of Ana Bartos et al.:

“The contribution of land-use change versus climate variability to the 1940s CO₂ plateau: Former Soviet Union as a test case” In this study, authors attempted to explain why the stabilization of atmospheric CO₂ concentration was observed during the 1940s. Earlier, Bastos et al. 2016 have showed that the global CO₂ budget in terrestrial ecosystems during this period has a gap sink of 0.4-1.5 PgC yr⁻¹. To explain this gap, authors made 2 hypotheses: (1) huge land-abandonment due to the socioeconomic and demographic disruptions during World War II that might lead to an additional C

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sequestration and (2) the warming observed in the high-latitudes for the same period, which might cause the enhancement of the natural C sink to vegetation. Unfortunately, I see some very serious problems, which do not allow to support the publication of this MS. I could agree that croplands abandonment took place in FSU during WWII. However, the period when current croplands were not used was short – not more 1-2 yrs. People which stayed on territory occupied by Nazi, had to produce food for them and themselves. Besides, withdrawn area was much less than it reports in the study – 62 Mha between 1940-1943. Here I support completely anonymous Rev # 2. Authors often used uncorrected agricultural statistics. It's also important to consider that the abandonment of high fertility soils can led to C-losses especially during first years after withdrawal (Romanovskaya, 2008; Lyuri et al., 2010, Kalinina et al., 2015). Such situation took place in Ukraine and south part of Russia, which were occupied by Nazi during WWII. So, I guess, that the amount of C sequestered due to agricultural land abandonment are strongly overestimated, and even some additional soil C can be released as CO₂. For correct estimation of C budget on FSU territory during the 1940s, authors have to take account of other disturbances which might to impact on C balance. Here are some of them: - large amount of CO₂ emitted to atmosphere as a result of forest fires, burning biomass in abandoned fields, fires in thousands of villages and many big cities on the occupied territory; - decrease C sink due to deforestation in European and especially East part of FSU to provide the functioning of military factories and heating of housing possible only by wood during the WWII; - possible decrease of emitted CO₂ due to collapse in transport, coal industry, and industry during first 1-3 years of WWII.

Of course, it's very complicated aim to estimate all disturbances caused by WWII, but authors have to be more thoughtful and interpret more carefully statistical data and results of modelling.

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