

Interactive comment on “Comparing the impacts of 2003 and 2010 heatwaves in NPP over Europe” by A. Bastos et al.

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Received and published: 3 December 2013

The authors are analysing the impact of the exceptional heatwaves in 2003 and 2010 on the plant production in Europe using MODIS satellite data of NPP and photosynthesis. They are stressing on the larger magnitude of the 2010 event in comparison to 2003 and highlight the role of the soil atmosphere exchange. The focus of the work is on the spatial-temporal analysis of the physical variables driving the exceptional character of the heat-waves and potential differences in those. The paper is very well suited for the audience of Biogeoscience and I would recommend its publication after moderate revisions. However, I find the title a bit misleading because it only mentions NPP were also photosynthesis and soil moisture patterns etc. and their relation are part of the analysis. I would suggest “Analysing the spatio-temporal impacts of

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the 2003 and 2010 extreme heat waves on plant productivity in Europe” The analysis relies on the MODIS C5 MOD17 as well as A3 and A2 data series for the time 2000-2011. The analysis is therefore also dependant on the meteorological data used for the MODIS NPP product, the NCEP/DOE II reanalysis. However, for the identification of the climatic/meteorological conditions/anomalies the authors use ERA-interim and GPCP precipitation data. From my point of view it is not clear how consistent these data are with NCEP. In the frame of CMIP 5 Sillmann et al. (2013) are comparing models to the different datasets used here. Especially, as the authors are focusing on spatio-temporal pattern some discussion about uncertainties arising from using different reanalysis products needs to be elaborated. This in particular true as the authors are using the data to identify the potentially different drivers of vegetation response. The question here would be, are these patterns in the ERA-Interim product consistent with the NCEP dataset? One of my main concerns for the paper is the role of the very different distribution of landcover types in the two regions see Teuling et al. (2010)? The fact itself is mentioned at page 15889 l8-14., but not discussed in detail! Did potentially higher percentage of forest in Russia impact on the magnitude of the impact? – Maybe only similar land cover types should be compared if aggregated figures for Europe are given? Fig 3 (by the way the figure says CS for cultivated land the text below it says MCS) gives us a glimpse of the potential differences and the author note the very different response of cultivates areas on page 15889 and very nicely identify the influence of human interventions as a potential reason but don't go any further. Related to the effect of land cover on the magnitude of the impact would be the role of the widespread fires in 2010 in Russia Shvidenko et al. (2011) which are a substantial source of dynamic in the carbon cycle. Again here the role of human intervention or better the lack of it might be a point to discuss. I find it also difficult to understand if total impacts are given, like in the abstract p 15880 l 14-15, without the related areas. 94 TgC for 2010 is of course larger than 19 TgC but the area affected is also larger, these numbers lack some information about the magnitude of the impact on ecosystems. The “Result” part of the paper is rather a “Result and Discussion” and the “Discussion and

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final remarks“ reads like “conclusions”. So I would recommend to either restructure the content by opening a discussion section or simply change the title of the sections.

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Interactive comment on *Biogeosciences Discuss.*, 10, 15879, 2013.

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