Replies to Anonymous Referees

Replies were prepared by Brian Magi, Sam Rabin, Elena Shevliakova, and Steve Pacala. Our replies follow the specific referee comments and are indented in italics. Thank you to both the referees for their time and suggestions.

Reply to Anonymous Referee #2

Magi et al. separate the agricultural from non-agricultural fires based on satellite data. This topic is relevant and the presentented results useful for the improvement of fire modelling within earth system models. The methods are clearly described and the results presented in a well structured way. The discussion gives a nice review of regional differences in fire patterns. Although the results are revelant, the results presented are few and could be extended with for instance showing a global map with the peak month of agricultural and non-agricultural burning or plots similar to Fig 3. But instead of presenting the interannual variability as error bars, the variability within the region. An interesting addition could also be the separation not only in agricultural but directly into cropland and pasture fires. It would also be interesting to see how these results compare to seasonality of the emission data of the GFED version 3 database, which have been separated into sources.

> *We apply our methods on a regional basis using the variance within a region to calculate Fnbar and Fabar (Eq. 5 and 7). Perhaps unfortunately, this means that Fnbar and Fabar do not vary within a region. As we mention in the conclusions, better regional definitions would likely improve the spatial resolution, at which point we agree that standard deviation of seasonality within a region would be interesting to compare to standard error of the mean over all available years. Presumably, with proper regional selection, the standard deviation of seasonality within a region would be minimized, while with more years of data, the standard error about the mean annual seasonality would be minimized or reveal months with real physical variability of fire type or burned area for that region.*
>
> *GFED emissions have been partitioned using the UMd land cover classification. Overall, the seasonality of GFED emissions for savanna (which most closely corresponds to HYDE's "pasture") and cropland are very similar to our results, for both burned area and fire counts. This is not surprising given that GFED emissions are based on GFED burned areas, which in turn are based on MODIS fire counts. However, as implied in our Conclusions, we are examining more detailed partitioning of fire seasonality into land cover types including pasture and cropland separation. In that work, we will compare with GFED emissions seasonality.*

p.5552,l.20: see also Kloster et al. 2010 and Thonicke et al. 2010, both use the population density

Kloster et al. (in their Section A4) and Thonicke et al. (their Section 2.2.1) both use the same functional dependence on population density as Pechony and Shindell (2009), so no additional insight can be gleaned from these more recent publications.

p. 5553, l.1: missing blank

Thanks.

p.5555, l. 3: the hyde data for the year 2000 is used until 2004, for 2004 the year 2005 might be more representative.

We obtained HYDE 3.1 land-use updated through 2009 and annually resolved from 2000-2009 directly from K. Klein-Goldewijk in June 2012. The methodologies used to produce this extension to HYDE 3.1 are identical to those used to create year 2000 and year 2005 land-use datasets. The results in our Figure 3 are updated to reflect the use of the HYDE 3.1 extension and the text in our Section 2.3 is updated as well. Regarding our results, there is no significant impact on the seasonality and therefore we made no changes to the discussion in the text.

Fig. 3: the zero line is not necessary and can be confusing as it has the same color as the lightning frequency.

Thanks for pointing that out. The zero line was removed from the figure.

Fig. 4: the fraction of burned pasture and burned crops to burned land would be an interesting addition.

We are still testing this.