Many thanks for the revisions. However, I still have an issue with equation 3.

Thank you, below are further explanations, and an update on the LU_{thresh} parameter to correct an error in reporting the equation and in Table 1. We also describe small changes to the text in the manuscript, and a new figure in supplementary material.

It is still not clear what LU actually is (never defined), and how you can integrate over it. My assumption is that LU represents the grid cell fraction of one particular land use type over which you integrate (which leads me to think that this should be a sum rather than an integral), though at some places in the manuscript it seems that you rather refer to the agricultural fraction of the grid cell. If that was the case, why is there an integral at all? Note that there is also some ambiguity in the units of this equation as LU_tot has the unit km2, whereas LU_thres is dimensionless?

LU is the variable across which we integrate, for a given grid-cell. It goes from 0km^2 to the total landuse area of that grid-cell (LU_{tot}). Landuse was defined in the data section 2.4.3 as "*the sum of crops and urban lands in the GlobCover data.*" which we now also indicate under equation 3.

The integral is computed over the LU_{tot} area of the grid-cell to infer the contribution of each km^2 of landuse to the total ignitions. The first km^2 have a higher contribution than additional ones, until we hit the threshold, after which more landuse doesn't contribute anymore anthropogenic ignitions.

Let's say a grid-cell of 100km^2 has 20km^2 of landuse. The first km^2 contributes maybe 2 ignitions, the second only one, the third only half, and so on until the 10th km^2 (LU_{thresh} of 0.1, or 10%), which will contribute very little. From 10 to 20km^2, no more ignitions are modeled. So a grid-cell with 10km^2 of landuse will have the same number of anthropogenic ignitions than a grid-cell with 20km^2. This is now made clearer with the new figure in supplementary material, Figure S1a, which shows the decreasing contribution of landuse to anthropogenic ignitions. Figure S1b (formerly figure S1), is the integral of figure S1a.

The equation was inaccurate however in that LU_{thresh} was not converted from a fractional value to an area (km^2). It is done by multiplying LU_{thresh} by the area of the 1-degree grid-cell, which depends on the latitude. The LU_{thresh} value (0.1) occurs with different absolute landuse area: approximately 1200km^2 for a grid-cell at the equator, but only 600km^2 around 60degrees North. This is why Figure S1 is specific to a given latitude, as indicated in the caption.

In the end, Eq. 3 is rather long, but we tried to keep meaningful acronyms (e.g. cell_area), and hope figure S1 (with the new sub-figure) as well as the description of each term and of the overall mechanisms the equation conveys are appropriate for a good understanding. It now reads as follow:

$$ANTHROP_{ign} =$$

$$(1 - GDP_n)^{GDP_{exp}} \times LU_{ign} \times$$

$$\int_{LU=0}^{LU=LU_{tot}} \left(\frac{(LU_{thresh} \times cell\_area) - min[LU, (LU_{thresh} \times cell\_area)]}{(LU_{thresh} \times cell\_area)} \right)^{LU_{exp}} \quad \text{Eq. 3}$$

where GDP_n is the normalized Gross Domestic Product per capita (from 0$ to 60000$), GDP_{exp} the associated shape parameter, LU_{ign} the initial number of ignitions per km^2 of land use, LU_{tot} the land use area (km^2) in the grid-cell considered, computed as the sum of crops and urban areas (see Sect. 2.4.3.), *cell_area* the area of the grid-cell (km^2, a function of latitude), LU_{thresh} the fractional land use value beyond which additional land use does not contribute any more ignitions, and LU_{exp} the shape parameter controlling the decrease in the amount of additional ignitions with incremental land use. LU_{thresh} was initially set to 1, but the exponent parameter LU_{exp} was systematically optimized at very high values. LU_{thresh} was thus progressively decreased to a final value of 0.1, pointing to a rapid saturation of human ignitions with land use. LU_{ign} and GDP_{exp} were also determined through the optimization procedure. Eq. 3 conveys the following fire driving mechanisms:

- Anthropogenic ignitions increase with human occupation of the landscape, but at a lower rate with additional land use, and saturate once 10% of the landscape is occupied (Figure S1).

- Fire use for land use management depends on the regional GDP, with maximum fire use in the poorest regions, and virtually no fire use at all for regions beyond 60000$/capita. Only one country (Qatar) has a GDP beyond this range in the data. In

the future, more countries are expected to have a GDP over 60000$/capita, and thus would not have any human ignitions (see discussion).

In Table 1: Why is there a range for LU_thres, and not one value? How does this vary? Or is this a typo, implying that 0-0.1 is the optimisation range?

Sorry about that, it was a typo and has now been corrected, LUthresh is a single parameter of 0.1.