Reply to Referee#2

We would like to thank the reviewer for his/her positive evaluation of the manuscript and for the useful comments and suggestions. Below we address the raised concerns. The reviewer's comments are shown in bold and our replies are given in blue and additions to the original text in green.

First, we mention the following correction: The third panel of Figure 3 (GFWMD trend) has been replaced as there was an error in the upload of the figure.
In addition, we have added Table S5 in the Supplement, which provides absolute and relative tree cover trends over 2001-2016 for a selection of 25 countries worldwide as derived from MODIS, ESA, and GFWMOD datasets.

Line 20: "At national level, the increasing trends in forest cover reported by some national inventories (in particular for the US) are contradicted by all remotely-sensed datasets". I anticipate this section will peak substantial interest for a variety of audiences. I suggest adding a brief clause as to the cause of the discrepancies (a short reference to section 3.3).

The following is added in the abstract of the revised manuscript:

L. 20: "At national level, the increasing trends in forest cover reported by some national inventories (in particular for the US) are contradicted by all remotely-sensed datasets. To a great extent, these discrepancies stem from the plurality of definitions of forest used. According to some local census, clear cut areas, seedling or young trees are classified as forest while satellite-based mappings of trees rely on a minimum height."

Figure 9 and supporting discussion: Zhu et al. (2017) attribute trends in HCHO in the Northwestern US to increasing forest cover. Is this compatible with your results?

In Zhu et al. (2017), an increasing HCHO trend (5.4% yr^{-1}) was derived over a few 0.5°×0.5° pixels in the Northwestern US, located within a large box (~39°-45°N and 124°-120°W). The trend was attributed to a large increasing trend (4.3% per year) of the needleleaf evergreen trees (NET) over 2005-2014 estimated using MODIS land cover data.

In our analysis, MODIS NET shows only a small increasing trend of 0.17% yr^{-1} when considering the aforementioned box, and a decreasing trend is found based on the 4 points (-0.09% yr^{-1}). The GFWMOD shows strong decreasing trends of from -0.3 to -0.4 % per year in either case. Those results are therefore very different from those given by Zhu et al. (2017), for reasons unclear but possibly related to the earlier version of MODIS land cover data used in Zhu et al (2017).

Furthermore, the QA4ECV OMI HCHO averaged over May-September showed lower positive trends over this area based on either the 4 cells (2.87% yr^{-1}) or the entire box (1.13% yr^{-1}). Note however that we did not apply any temperature-based correction to HCHO columns as in the study of Zhu et al. (2017).

Can the authors briefly comment on discrepancies in the magnitude of monoterpene emission trends (as in the summary, second bullet, or as in Figure 7)? While not the focus of this work, the results would be interesting given the high variability in trends in the northern latitudes.

Isoprene is the focus of this work. Monoterpenes are included in the IMAGES model calculations, based on MEGAN estimates using gridded basal emission rates. The latter is not adequate for the analysis of the impact of LULC changes on monoterpene emission trends.

In section 5, CO_2 inhibition is turned on, whereas it is neglected previously. This leads to some confusion as to whether the emission trends presented previously apply to the HCHO trends shown here. I suggest incorporating the CO_2 inhibition factor throughout.

The CO_2 inhibition effect is very uncertain and for this reason was neglected in the core of this study (Sect. 3 and 4). It was accounted for in the HCHO simulations as it has a substantial offsetting effect on isoprene trends (-0.5 $\%yr^{-1}$) which improves the agreement with the HCHO trends. The impact of CO_2 inhibition (and soil moisture stress) is briefly discussed in Sect. S6 in the Supplementary material and mentioned in line L.452 of Sect. 4. The following clarification and correction are added in Section 4 of the revised manuscript:

L. 452: "Note that the CO_2 inhibition effect, not considered in those simulations, would further offset global trends by about ~~0.22% yr^{-1}~~ 0.5% yr^{-1} according to the parameterization of Possell and Hewitt (2011), whereas the soil moisture stress has little impact on trends (Table S6 and Sect. S6)."

We added the following clarification at the beginning of Section 5:

L. 542: "Three global simulations with the IMAGESv2 model are performed over 2005-2016. The period is selected so as to coincide with HCHO data availability from the OMI satellite. The biogenic isoprene emissions used in those runs are described in the previous section, except that the inhibition effect of CO_2 parameterized following Possell and Hewitt (2011) is now taken into account. Although very uncertain, its inclusion is motivated by its substantial effect on isoprene trends (discussed and quantified in Sect. S6), which improves the agreement with OMI HCHO trends. The three runs are: run A, using the CTRL emissions; run B, using the ISOPMOD emissions; and run C, using the ISOPGFW emissions."