

## ***Interactive comment on “Climate changes and wildfire emissions of atmospheric pollutants in Europe” by W. Knorr et al.***

### **Anonymous Referee #1**

Received and published: 23 March 2016

Review: “Climate changes and wildfire emissions of atmospheric pollutants in Europe”

The manuscript assesses the impact of climate change in Europe on wildfire emissions of atmospheric pollutants and potential consequences for air quality. The authors conclude that wildfire emissions have a minor role for air quality in Europe under present day conditions. This might change in the future for a high emission scenario in combination with reduced anthropogenic emissions of air pollutants. The results are based on a fire model study combined with satellite based observational data and are subject to large uncertainties related to wildfire emissions and future projections of anthropogenic emissions. These uncertainties are discussed in detail in the manuscript. Conclusions on the policy relevance of the results are based on a back-of-the-envelope transformation of emissions into concentrations. Using an atmospheric chemistry model would be a better way, given, however, that the emission estimates

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already point to a weak impact, this assessment is probably sufficient. Overall, the manuscript addresses an important topic by comparing wildfire emissions of air pollutants to anthropogenic sources for present day and future. The relatively new aspect is thereby the combined assessment of anthropogenic emissions and wildfire emissions and the assessment of air quality impacts. This should be reflected more in the title of the manuscripts. I recommend publications after some revisions (see specific points below).

The manuscript reads in part a bit lengthy and could be shortened (e.g, the discussion on the pros and cons of different fire models). In parts I was confused whether model results or GFEDv4 is discussed.

Specific comments:

Methods:

Fire model results are used to scale satellite based observed burned area (GFEDv4) into the future. The scaling is done on a country basis. Countries are not related to fire occurrence. Does averaging on a country basis impact your results? Also I was wondering whether SIMFIRE does actually produce fires in all regions of Europe, i.e. do you get a scaling factor for each country in Europe? Here it would also be helpful to show how SIMFIRE actually compares to GFEDv4 in Europe.

What about future landuse change? Is this considered in SIMFIRE?

Regarding the chemical species: Do you use the species provided by GFEDv4 and apply the emissions factors or Andreae and Merlet only to your model results, or are the emission factors applied to both? Is this consistent?

Line 155: were does the number two come from? Does this refer to Table1?

Line 238: Emission factors by Andrea and Merlet: Many studies use emission factors by Akagi et al. For completeness it would be nice to document the emissions factors applied in this study and compare them to the one given by Akagi et al.

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Line 308: Please explain the different Pegasus scenarios used in the Table.

Line 355: Knorr et al. ? – please complete.

Line 355: Figure1/Figure2. Are the wildfire emissions in Figure1 and Figure 2 from SIMFIRE or from GFEDv4? I thought the climatological mean refers to GFEDv4. In this case, however, I do not understand the discussion on SIMFIRE here.

Line 359: Are the climatological means comparable for Portugal and Russia, or the single large wildfires events in these regions. Please clarify.

Line 372: I'm not sure I understand this. Fire emissions you have monthly, but anthropogenic emissions only annual? For the annual anthropogenic emissions the 'residential and commercial' sector is excluded when calculating the contribution of wildfire emissions in the peak burning season? Please clarify this.

Line 398: The paragraph on the relative importance of different regions for the total wildfire emissions in Europe would fit better into the previous section were the climatological mean is discussed and not so much in the 'predicted change' paragraph.

Line424: Do these numbers refer to Table3? Please, check.

Line 449: Please rephrase this sentence.

Line 458: Why doesn't the change in population contribute to the change in wildfire emissions?

Line 466: How is this consistent with Figure4?

Line 473: Please rephrase. The paragraph could be moved to the discussion/conclusion.

Line 506: A mfr for air pollutants does not necessarily relate to less climate change.

Line 546: boundary layer height

Line 561: reported

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Line 559: I do not understand how derive 1.6 mug/m3.

Line 564: why do you consider a level of 3 mug/m3 and not 10 as the WHO does?

Line 574: This discussion might be better placed in the conclusion section.

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Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2015-1000, 2016.

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