Response to Reviewing committee comments: *Wildfire ignition probability in Belgium*

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We would like to thank the referees for their constructive comments. The minor revisions have identified some lacunae in the conclusions of the manuscript. According to these latest suggestions of the reviewers,the manuscript improved in terms of clarity and nuance in the drawn conclusions.

More specifically, we extended our conclusion, including some remarks on (i) the impact of (i) the spatial resolution of our model, and (ii) the omission of weather conditions. To elaborate our answers to the reviewers' comments, the following color scheme is used: comments of the referees are shown in **blue**, answers are in black and quotes from the revised text are in **green**. The lines in the final manuscript are indicated in **purple**, while the lines in the manuscript with tracked changes are in **orange**.

1   Referee #3: Minor revision

I recognize the effort made by the authors to answer to the points I raised and I think that the manuscript has improved substantially.

- *I am still not convinced by the spatial scale chosen. Is 100 m still compatible with the type of available information about fire events? And is this resolution really required for the type of maps the authors intend to generate? I realize that this is not an easy question but, as pointed by the authors, when degrading from 10 m to 100 m had impacts on results (e.g. on Figure 7).*

- *I am also not convinced by the choice made by the authors to neglect weather conditions. However I realize that it would be difficult to incorporate this information at the current stage of the manuscript.*

I therefore strongly suggest that these two issues (and their possible implications) are addressed by the authors in their concluding remarks.

As to the first remark of the reviewer: we're confident that the lowering of the spatial resolution has not led to major differences in the probability map (Figure 1). The resolution had also no impact on our conclusions drawn with regard to the most optimal model. To better justify the scale we used (and why it has to be so low), we adapted the first paragraph of the conclusions:

L498-503/**L498-503**   *The study was complicated by (i) the lack of literature on wildfires in Belgium, (ii) the limited number of ignitions, **and (iii) the uncertainty of the ignition locations. The latter was a decisive factor in determining the optimal spatial resolution of the model, i.e. low enough to capture the uncertainty on the ignition***

data while high enough to allow for the application of our model at a provincial or municipal scale.

To answer the second remark: we do expect that meteorological conditions are an important factor for wildfire ignitions. Given that we want to produce a static probability map, we are restricted to 'aggregated' meteorological (= climatic) covariates. We briefly discussed 'precipitation' and 'drought sensitivity', yet came to the conclusion that these are not optimal for ignition prediction on an annual scale. We better clarified our meaning in the methods section:

L318-321/**318-321** *Given the fact that most anthropogenic wildfires are controlled by drought (Burk et al., 2005), we advise future research to develop more suitable proxy variables for drought in Belgium* **that reflect the different responses of different plant communities and soil types to precipitation deficits.**

and we stressed the potential added value of better proxy variables in the conclusion:

L520-534/**L520-534** *In order to calculate the ignition probability, we used a straightforward data-driven approach relying on Bayes' rule. Contrary to other approaches (X et al., XXXX), the resulting map provides a tangible estimation of the annual probability that a wildfire will ignite in a given pixel of 100 by 100 m. Moreover, we demonstrated that this approach can be used to obtain an estimate of the average annual ignition probability in a certain area. Our method involved the delineation of environments through the combination of predictor classes. Because of the limited number of wildfires, it was necessary to limit the number of environments to 20, and hence the number of covariates to three.* **To allow for more covariates, an expansion of the ignition database would be necessary.** *It could be concluded that the approach relying on exactly three covariates (land cover, soil, and land use) led to the most reliable wildfire ignition probability map, which is, moreover, robust to an increase in the number of wildfires in the underlying database.* **We assume that our model could be substantially improved through the inclusion of more covariates, preferably a drought index for Belgium that reflects plant moisture sensitivity to precipitation deficits.**
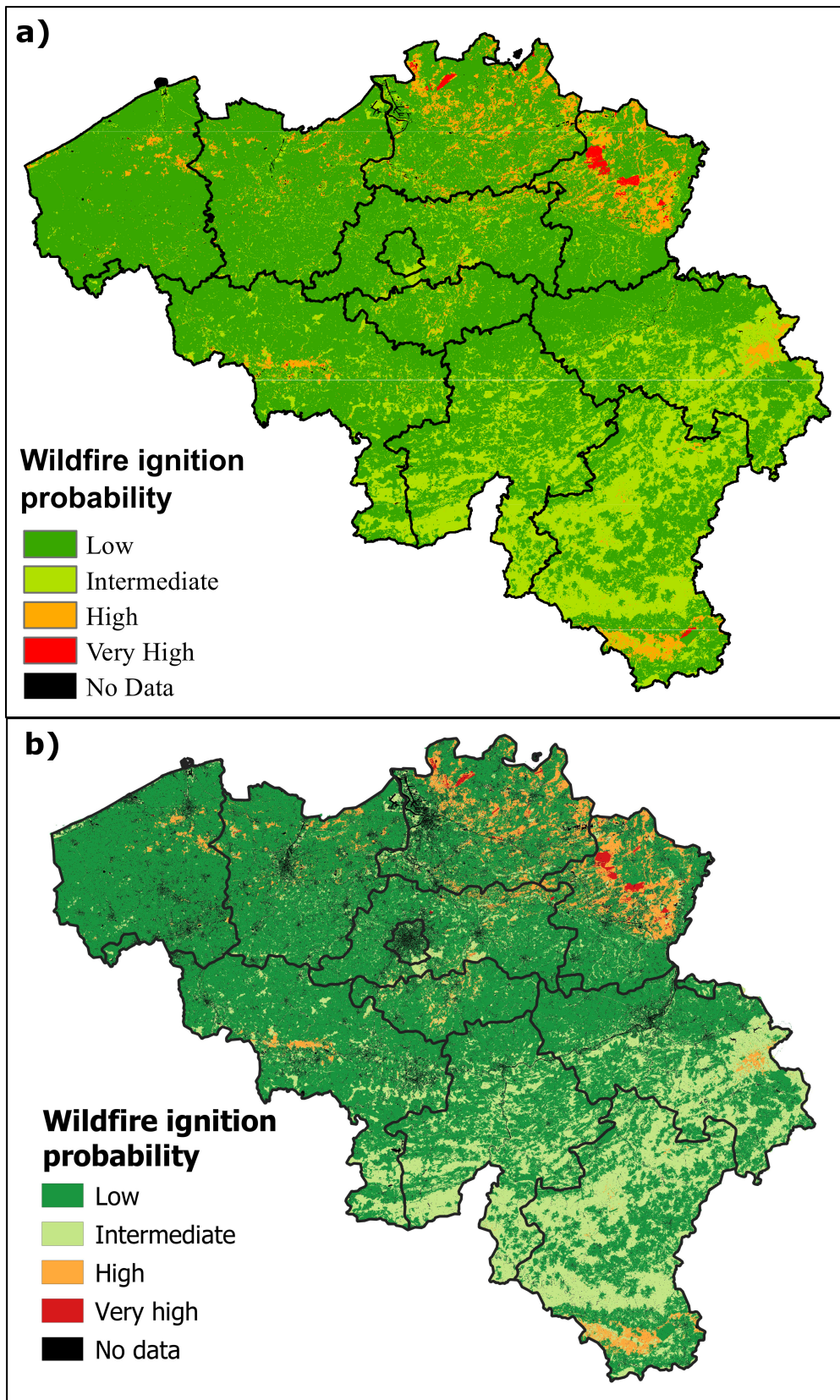
Figure 1: a) probability map on 10 m resolution and b) on 100 m resolution.