

## ***Interactive comment on “Impact of optimized mixing heights on simulated regional atmospheric transport of CO<sub>2</sub>” by R. Kretschmer et al.***

### **Anonymous Referee #1**

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The authors address an important issue for regional carbon inversions—i.e., the error introduced due to imperfections in the simulated mixing heights. These errors are of first-order significance and need to be confronted by anyone seeking to carry out regional carbon inversions. The authors describe and show a way forward—i.e., a geo-statistical method that combines models with observed mixing heights.

My general (minor) criticism would be that the paper is lengthy and makes the reading feel tedious at times. That being said, the methods are solid and the authors clearly demonstrate care in assessing and interpreting their results. So the criticism is purely with the presentation, and not the substance. That being said, I don't have a specific suggestion as to how to tighten up the paper. The same thing can be said about the figures: are all 14 of them essential?

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Another small criticism is in Sect. 2.2.1 ("Estimation of MH uncertainty"). I found it difficult to follow the methodology embodied in Eqs. 2~4. Could a figure of a Ri<sub>g</sub> vertical profile and the different indices help the reader understand what is meant? Here I am suggesting an additional figure while earlier alluding to the fact that there being too many figures, so could the authors think about removing or consolidating a few of the figures?

In any case, the aforementioned are both minor points and the paper is solid and can be published with only minor modifications.

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