**Atmospheric
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Comment

Interactive comment on "How much CO was emitted by the 2010 fires around Moscow?" *by* M. Krol et al.

M. Krol et al.

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We address here the comments my L. Yurganov (in italics the selected remarks)

Regretfully, Krol et al. has not demonstrated the effect of taking averaging kernels into account. I would recommend doing this in the final version of the paper

We agree that the sensitivity of the satellite for the vertical CO profile is a key issue. Our 4DVAR calculations sample the modeled columns with the Averaging Kernel (AK) stored in the IASI product. Alternatively, we could simply compare the modeled total column to the total column in the IASI OE product. However, this would implicitly assume a flat AK with equal sensitivity to CO at each altitude, which is in conflict with the true sensitivity. Although we agree that such calculations may yield some educational

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insights, we refrain from such a comparison because it is simply unphysical. However, we will provide the modeled 3D CO distributions upon request.

Low sensitivity to the boundary layer makes fitting of the model to the measurements very uncertain. In the worst case, zero sensitivity, a correct estimate may be impossible at all. However, IASI appears to be a good sensor, but it is not ideal.

We agree that a low sensitivity to surface CO is not ideal for source inversions. However, we include IASI data over a large geographical area in our source inversion. Eventually, the surface CO will be transported to higher altitudes at which IASI has better sensitivity. We acknowledge that this implies that the derived emissions are sensitive to the vertical redistribution, an issue that we discussed in some detail in the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 28705, 2012.

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