

**Referee #2: Rayner, Peter**

This paper compares several methods for "downscaling" CO<sub>2</sub> emissions using different spatial proxies. It compares the proxies by comparison with satellite NO<sub>2</sub> column measurements which are regarded as proxies for anthropogenic CO<sub>2</sub> concentrations. The paper is clearly in scope for ACP. It is well written with extensive and useful citation of the relevant literature. I find it to be a very good paper. Its aim is limited, pointing out a sensitivity to the spatial proxies used and making a suggestion about the best choice, at least for China. It achieves this aim well however. Interestingly the choice is similar for the U.S. where the validation dataset is the emission inventory from the VULCAN project.

**Response:** We thank Referee #2 for the encouraging comments.

My only concern for the paper is lack of availability of the various underlying datasets. I'm not sure what the current policy of Copernicus journals is but verification of this analysis plus more general utility requires the community to be able to access the various emission products used in the paper. I believe availability of these datasets should be a precondition for the publication of the article but this is a question for the journal itself.

**Response:** Spatial proxies from the best case of the six scenarios in this study are utilized to allocate emissions in the MEIC model. Gridded emissions from the MEIC model are publicly available via <http://www.meicmodel.org/>.