**Atmospheric
Chemistry
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Discussions**

Interactive
Comment

Interactive comment on "Technical Note: A new coupled system for global-to-regional downscaling of CO$_2$ concentration estimation" *by* K. Trusilova et al.

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Indeed for the analysis in this study we selected the measured and modelled data only between 10:00 and 17:00 UTC, which are often used for atmospheric inversions of carbon fluxes.

The main reasons for this choice are the coarse vertical resolution and the lack of appropriate parameterization of nocturnal mixing within the atmospheric models used for the inversion. Vertical resolutions of the TM3 and STILT models presented in our technical note are:

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Interactive Discussion

Discussion Paper

- 41-66 m in the first three layers of the global TM3 model that uses meteorological fields from the NCEP/NCAR reanalysis

- 10-35 m in the first three layers of the regional STILT model that uses ECMWF forecast data.

This causes vertical mixing during night time to be poorly represented (and mostly overestimated), with the consequence that the nocturnal build-up of CO_2 within the first few hundred meters near the surface is usually underestimated. We admit that this needs to be addressed in future studies, since if nocturnal CO_2 data can be used one would be able to much better separate respiration and photosynthesis. However, given that still significant progress in transport modelling is required for this, we regarded this as not in the scope of this technical report.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 23187, 2009.