

## ***Interactive comment on “A framework for comparing remotely sensed and in-situ CO<sub>2</sub> concentrations” by R. Macatangay et al.***

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This article uses a combination of in-situ measurements from towers and aircraft, Solar Fourier Transform Spectrometer (FTS) measurements and atmospheric transport models at various scales to test the relationship between in-situ and FTS measurements of CO<sub>2</sub>. The paper is predominantly methodological since, as the authors point out, the FTS used is not optimal for CO<sub>2</sub>. The methodological aspects are, however, quite important since, with two CO<sub>2</sub> satellites scheduled for launch around the end of 2008 there is a clear need to establish a good link between surface and satellite measurements and the solar FTS measurements are the logical (and preferred) vehicle for doing this. The paper does, indeed, demonstrate such a method. The results don't seem very encouraging but we did not expect great things from the 120M for this task.

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More concerning to me is the difficulty in evaluating the method itself. I did not leave the paper with a clear sense of what contributed to the scatter between the results predicted from the model and in-situ data and the FTS. For example, data from TM3 and balloons were appended to the aircraft measurements to produce the total column for comparison. This isn't necessarily straightforward. It might help to know how well TM3 reproduced the aircraft measurements themselves. Similarly there were significant differences between concentrations simulated with WRF and STILT. Should we regard this as a measure of model uncertainty? Does one of them fit the aircraft observations better than the other? Also, why wasn't the WRF vertical integral performed with the correct averaging kernel? It would be best to do this consistently but failing that the authors should test the importance of this omission using STILT where, presumably, analysis is computationally cheaper. I would hope that the authors can strengthen their analysis to incorporate these points during their revision. Peter Rayner

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