

Interactive
Comment

Interactive comment on “The CO₂ tracer clock for the Tropical Tropopause Layer” by S. Park et al.

Anonymous Referee #1

Received and published: 29 June 2007

General Comments

This manuscript presents measurements of CO₂ in the TTL, and calculations of ascent and mean age in the upper TTL. There is a lot of interest in the TTL and this paper presents new and interesting measurements and analysis. It is generally well written, and I think it will be suitable for publication after consideration of the comments below.

Specific Comments

1. In several places it is stated that this manuscript includes an inter-hemispheric comparison of CO₂ measurements. Although the 2 sets of measurements are in different hemispheres they are also at different longitudes. How do you know that they differences are due to north vrs south hemisphere rather than east vrs west differences? Given this, I don't think you can put as much emphasis on the inter-hemispheric comparison.

2. I think there needs to be more discussion of when CO₂ clock calculations can be applied. For the time lag to be the mean age there needs to be a near linear increase/decrease in CO₂ at base over sufficient time period (2-3 times the mean age) before the measurement date. Because of this you cannot calculate clock for measurements at all times of the year (e.g., when measurement at 390K is just after the time of the peak in CO₂ at 360K). This is not an issue for particular case, but does limit when method can be used.

3. Is the quoted uncertainty in slope of CO₂ time series at 360 K the real uncertainty? I believe it is just the uncertainty in the time series of Hawaii-Samoa measurements. I think there is an additional uncertainty in how well this proxy time series fits the CO₂ at 360 K, and some consideration of this is needed.

4. Can't the same analysis (calculation of mean age from CO₂) be applied for STRAT data? There are CO₂ measurements from 360 to 390K which can be compared with the slope over the NH summer.

Minor Comments

pg 7, l 16-21: Many of these references have nothing to do with measurements within the TTL (some are not even measurement papers, eg Hall and Prather 1993).

Pg 14, l 11-: I think the discussion of surface measurements (pg 15, 4-10) should be moved to this paragraph. When I first read this paragraph I immediately wondered what the surface observing network said about spatial variations in the tropics, so I think better to have discussion here rather than in next paragraph.

Pg 18, line 26-27: More information is needed on advection-diffusion model calculations. As it stands this tells the reader nothing.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 6655, 2007.