Atmos. Chem. Phys. Discuss., 9, C551–C552, 2009
www.atmos-chem-phys-discuss.net/9/C551/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Sources and transport of $\triangle^{14}$C on CO_2 within the Mexico City Basin and vicinity" *by* S. A. Vay et al.

S. A. Vay et al.

Stephanie.A.Vay@nasa.gov

Received and published: 5 May 2009

J. Turnbull has made two excellent points. Regarding the metal canisters, many checks have been made in the past to look for high blanks (random canisters) and none were found. Tests have revealed no memory effect for CO2, it doesn't desorb on the canister's metal interior and pumps out well. The canisters are also re-conditioned between each use. Samples collected in these canisters during the CA to HI transit flight show that we can get typical N.H. 14CO2 background measurements if we are in a typical N.H. background region as they agreed well with the NWR data to within 0.4 ‰Ṡubsequent measurements over remote regions of the boreal and Canadian Arctic during 2008 revealed the majority of samples had 14CO2 values more typical of background levels. So there is no indication of a sample contamination issue.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

The modeled higher than average background expected in the tropics attributable to soil respiration by Randerson et al. [2002] is certainly ponderable. Measurements reported by Rozanski et al. [1995] and Levin and Hesshaimer [2000] reveal < 4 ‰ difference between 14CO2 levels within the northern hemisphere tropical troposphere compared to mid-latitudes. We are aware of only one actual 14CO2 measurement made in Mexico in a non-polluted setting near Tapalpa (19°57'N, 103°46'W) by Hsueh et al. [2007] in late July 2004 (i.e. summer when respiration rates are typically higher) of 64.6‰Ȯur samples were collected in late winter two years later and our radiocarbon sample collection strategy targeted pollution events in an attempt to quantify fossil fuel COÂň2. If we increase the background to include the 57-68 ‰ values, this then leaves us in a bit of a quandary in explaining e.g. from Figure 6 how a sample containing 69 ‰ 14CO2, > 396 ppm CO2, > 180 ppb CO, along with elevated i-pentane, benzene, and HCN is representative of the local background. We are only afforded this insight via the multi-tracer approach provided by the broad array of air quality and GHG measurements comprising the DC-8 payload.

This is a unique radiocarbon data set obtained over a highly urbanized, industrialized setting during the peak of the biomass burning season in a developing country. It is not clear that soil respiration would have such a dominant affect compared to the broader tropical region including e.g. rain forest, savannah, less urbanization. There have been a few studies that investigated the re-suspension of radionuclides from contaminated biomass by fires, mostly conducted in the boreal region [Paliouris et al., 1995; Amiro et al., 1996; Schuur et al., 2003; Wotawa et al., 2006]. The MILAGRO data seem to support a similar occurrence and indicate radiocarbon measurements, at least in the MCMA environment during the biomass burning season, will likely lead to an underestimation of fossil fuel CO2.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 7213, 2009.