

***Interactive comment on “Technical Note: Pitfalls with the use of enhancement ratios or normalized excess mixing ratios measured in plumes to characterize pollution sources and aging” by R. J. Yokelson et al.***

**R. J. Yokelson et al.**

bob.yokelson@umontana.edu

Received and published: 1 July 2013

article latexsym

We thank both reviewers for their valuable analysis and suggestions. In response, we have made two significant improvements in the paper that keep it focused on a relatively simple and common situation, but acknowledge the important wider context.

1. On page 4081, L13-17: we incorporate the more general point made by Referee #1:

C1465

Existing text: “Airborne, ground-based, or satellite measurements are frequently made only at one downwind point in plumes; or in any case, not directly at the source. Without explicit source samples, common analyses involve equating the downwind NEMR to an ER or comparing the downwind NEMR to literature ER if available.”

New text: “Airborne, ground-based, or satellite measurements are frequently made only in one downwind region in plumes; or in any case, not directly at the source. When a concentration gradient is observed this confirms mixing of two different air parcels, but if the origin of the two parcels that are mixing is not clearly established, then the interpretation of the NEMRs can be uncertain. However, even without explicit source samples or detailed knowledge of the mixing history, numerous published studies have equated the downwind NEMR to an ER or compared the downwind NEMR to available literature ER.”

2. As Referee #1 points out, Nowak et al., (2004) discussed a very relevant case where emission plumes mixed with both free troposphere and stratospheric air: a problematic scenario we mentioned on page 4080. We have highlighted this paper in new text on page 4080, line 25:

“In fact, Nowak et al. (2004) describe a very interesting case where Asian anthropogenic emission plumes mixed with both free troposphere and stratospheric air during transport across the Pacific. While many important NEMRs were meaningful, the mixing was too complex to allow a confident partitioning of the anthropogenic and stratospheric contributions to the observed  $\Delta\text{O}_3/\Delta\text{CO}$  NEMRs.”

Reference:

Nowak, J. B., Parrish, D. D., Neuman, J. A., Holloway, J. S., Cooper, O. R., Ryerson, T. B., Nicks Jr., D. K., Flocke, F., Roberts, J. M., Atlas, E., de Gouw, J. A., Donnelly, S., Dunlea, E., Hübler, G., Huey, L. G., Schauffler, S., Tanner, D. J., Warneke, C., and Fehsenfeld, F. C.: Gas-phase chemical characteristics of Asian emission plumes observed during ITCT 2K2 over the eastern North Pacific Ocean, *J. Geophys. Res.*,

C1466

C1467