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Atmospheric Measurement Techniques Discussions

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.

D. Parrish (Referee)

David.D.Parrish@noaa.gov

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The authors provide a very useful caution to researchers in atmospheric chemistry. It is certainly worthy of publication. However, I would prefer that they go further in their cautions. Something along the lines of the following.

Whenever a concentration gradient is observed in the atmosphere, that gradient represents mixing between air parcels of different histories. If those parcels are effectively background air and emissions from a source, then it is legitimate to interpret the ratio

of the slopes of the gradients of the two species as the ratio of those two species emitted from the source. However, as the authors point out, if the origin of the two parcels that are mixing is not clearly established, then the interpretation of the slopes can be misleading. Thus, anytime a person wishes to interpret a measured atmospheric gradient it is necessary to establish the source of the two (or more) air parcels that are mixing to produce the gradient before interpreting that gradient. Many papers interpret "enhancement ratios" within the continental boundary layer as emission ratios without explicitly identifying the two parcels being mixed, but usually no problem arises, but every situation may be different, so a careful scientist will carefully consider this issue before interpreting the measured gradients.

Nowak et al. (2004) present a useful discussion of some of the same issues that the authors raise.

Nowak, J. B., et al. (2004), Gas-phase chemical characteristics of Asian emission plumes observed during ITCT 2K2 over the eastern North Pacific Ocean, J. Geophys. Res., 109, D23S19, doi:10.1029/2003JD004488.

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