

Interactive comment on “Impacts of anthropogenic and natural sources on free tropospheric ozone over the Middle East” by Z. Jiang et al.

Anonymous Referee #3

Received and published: 28 April 2016

This is a nice little paper, clearly laid and well-presented, that provide some valuable insight into the title topic. It should be published, once the authors have addressed the few comments below.

Abstract: The Abstract needs a careful proofreading. For example, the authors state that “the global total contribution of lightning NO_x on middle free tropospheric O₃ over the Middle East is about three times larger than that from global anthropogenic sources.” In fact, Table 1 indicates a factor of two, not three. In the next sentence, by “summertime free tropospheric” I think they mean “summertime middle free tropospheric”. They then add “In the Middle Eastern lower free troposphere, emissions from

C13576

European and North American anthropogenic activities and from lightning NO_x are the primary sources of O₃”, but Table 2 says that European plus North American lightning NO_x is number 1, followed by local anthropogenic emissions, and then Asian lightning NO_x.

The transport analysis is puzzling, and needs some explanation, at least. Why did the authors choose to transport a long-lived tracer, rather than one with a lifetime similar to NO_x? Is CO being used as a proxy for PAN? Perhaps the authors want simply to elucidate transport patterns, but surely the NO_x lifetime would affect the result?

Minor points:

The Conclusions read a lot like the Abstract (and repeat some of the same errors).

The text refers to “European and North American”, which implies separate sources. “European plus North American” would be unambiguous.

P. 35525 l. 5: “...tropospheric O₃ peaks in the summer...”. This is true of surface ozone over Europe and the US, but over large areas of the NH it peaks in the spring, especially in the middle troposphere. Not an important point, since it does peak over the Middle East in summer.

P. 35527 l. 19: “in tropics” → “in the tropics”

P. 35528 l. 4: “seasaonlity”

P. 35528 l. 17: “over a 10o latitude” → “over 10o latitude”

P. 35529 l. 3: “distribution” → “distributions”

P. 35529 l. 19: “precursors” → “precursor”

P. 35530 l. 27: “are produced in free troposphere” → “is produced in the free troposphere”

P. 35531: “The contribution from Middle Eastern local emissions is much small (0.12

C13577

ppb), only representing 13% of Asian contribution. In contrast, Liu et al. (2009) indicated that O₃ production (as opposed to emissions) over the Middle East and Asia has similar contributions on free tropospheric O₃...” —> “The contribution from Middle Eastern local emissions is much smaller (0.12 ppb), representing only 13% of Asian contributions. In contrast, Liu et al. (2009) found that O₃ production (as opposed to emissions) over the Middle East and and O₃ production over Asia make contributions to free tropospheric O₃ of similar magnitude ...”

P. 35533 l. 17: “Observatoins”

P. 35534 l. 13: “a analysis in” —> “an analysis of”

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 35523, 2015.

C13578