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Interactive comment on "Significant increase of summertime ozone at Mt. Tai in Central Eastern China: 2003–2015" *by* L. Sun et al.

Anonymous Referee #2

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The paper describes the trends in ozone levels in North China. As pointed out by the authors there are very few studies of ozone trends in the rapidly developing region of China. The paper uses both new and previously reported data to look at ozone trends over ten years. There are several issues that need to be addressed/answered

1. The seasonal variation shows a typical spring maximum in ozone. This is a e result of maximum stratospheric-tropospheric exchange and whilst photochemical of ozone is maximised in the summer other loss process are enhanced and thus a typical dip in ozone is observed. There is no mention of start-trop exchange and the impact on ozone and this needs to be addressed.

2. More details are required on how the air mass types for the impact of long range transport, i.e. what is the statistical significance of the 5, why not, for example 7, a few

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more details on the cluster analysis need to be provided

3. The authors suggest that because the site is above the PBL O3 levels before dawn (e.g., 2:00–5:00 LT) are representative of the regional background O3. This could be the case, however all the that can be said is that the site is dynamically disconnected from the PBL, how can they be sure that it is representative of the background?

4. There is work by Clapp and Jenkin Atmospheric Environment 35 (2001) 6391–6405 that has shown that it is possible to quantify the regional contribution to oxidant (i.e. NOx independent) from plots of Ox vs. NOx. This work also looked at the contribution as a function of season too. This analysis should also be carried out for data presented in this present study and compare to the data presented in figure 7.

5. The authors use HCHO as a marker for anthropogenic VOCs. There are not only anthropogenic sources of HCHO, there are also secondary in situ production routes, such as from CH_4. Given that there are not only anthropogenic sources of HCO, who will this impact on their analysis?

6. they are using satellite retrievals to infer PBL HCHO. Satellite retrials in the PBL are notoriously difficult. What a priori assumptions have been made for their retrievals? More importantly what are the errors and what impact will it have on there results?