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Atmospheric Chemistry and Physics Discussions

Interactive comment on "How to most effectively expand the global surface ozone observing network" *by* E. D. Sofen et al.

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General comments.

This paper addresses a topic important to the development of atmospheric chemistry, how to improve the global coverage of surface ozone observations which are needed to more effectively constrain global atmospheric chemistry models. The paper is overall well-presented and appears to be without any significant scientific flaws and is appropriate for publication in ACP. A previous study addressed the more difficult issue of detecting trends in tropospheric ozone from ozonesondes and surface stations but with less sophisticated methods (Prinn 1988).

Specific comments.

There is one aspect of the logic of the paper that could do with a more explicit recognition, at least in my opinion. The purpose of the analyses is to determine where more surface ozone observations should be made including both for improved direct observations and improved testing of chemical transport models. The analyses the authors perform are based on the deseasonalized output of a chemical transport model. The level of skill of chemical transport models in determining the residual variations in surface ozone after the seasonal variations are removed is probably not well quantified. So this must have some influence on the results presented. I do not think any variation in method is required, just a specific acknowledgement of the circular nature of the process. A few lines would suffice.

The information in this paper is contained in one Table and 11 Figures. The information in the Figures should be of a quality that a reader can determine the plotted quantity from the figures for any area of the world of interest to them. As indicated in Technical corrections, I do not think this standard is met in a 4 of the Figures.

Technical corrections/suggestions.

Page 21026. Line 2, perhaps replace "almost 50 years" with "more than 40 years". The DASIBI UV photometer for surface ozone measurements in the global networks first appeared in the early 1970's. Page 21026. Line 14 include coverage for the continent of Australia. Page 21027. Line 16/17. The purpose of the GAW network is not primarily scientific, but rather to address key environmental issues (See WMO IGACO Plan). Page 21030. Line 5/6 Is it "covariance" rather than "similar variability" that is being used? Page 21032 Line 4. As the authors acknowledge, the large footprints may be erroneous due to the missing initial ozone destruction in springtime and photochemical production in summertime. Page 21033 Line 14-19. A more physically based explanation (a few lines) of what the k-mean cluster analysis is would be useful for most readers. Page 21043 lines 20-26. I find the conclusion of this discussion unsatisfactory for a scientific paper. The authors statement that the data is critical is right. They need to state that they know observations are being made in these areas, and come

to the conclusion they do, or advocate increased observations in these areas. Page 21051 Figure 1. Include latitude and longitude, make the coastline bolder, mark Cape Verde Observatory more clearly. Page 21054 Figure 4. I am puzzled that there is no desert in Australia in the Figure. Page 21055 Figure 5. This figure is difficult to read with inadequate colour contrast. Page 21056 Figure 6 (a) and (b). These figures are difficult to read with inadequate colour contrast.

Prinn, R.G., Toward an improved global network for determination of tropospheric ozone climatology and trends, J. Atmos. Chem., 6, 281–298, 1988.

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