Near-tropopause Ozone Variability at Tropical and Subtropical Ozonesonde Sites Revealed from Self-Organizing Map Clustering

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Recent efforts have been made to characterize long-term ozonesonde records with self-organizing map (SOM) clustering. Clusters of ozone (O_3) mixing ratio profiles reveal seasonal, source region, and large-scale meteorological influences on the tropospheric profile. SOM clustering of two tropical ozonesonde profile data sets by Jensen et al. (2012) revealed clusters corresponding to convection and subsidence, and biomass burning transport. Stauffer et al. (2015, submitted JGR) clustered >4500 O_3 profiles with SOM from four contiguous U.S. sites and found clusters that exhibited tropopause height anomalies of several km below monthly climatological values. Mid-tropospheric O_3 mixing ratios also deviated from climatology by up to +30% in a cluster containing polluted Wallops Island, VA O_3 profiles. We show the SOM clustering technique applied to tropical and subtropical O_3 profiles to quantify variability of O_3 in the near-tropopause region (NTR) over a range of latitudes. As in both the Jensen et al. (2012) and Stauffer et al. (2015) studies, we find O_3 profile clusters reveal features of O_3 in the NTR that would otherwise be diluted by monthly or seasonal averaging techniques.

References

Jensen, A.A., Thompson, A.M., and Schmidlin, F.J., Classification of Ascension Island and Natal ozonesondes using self-organizing maps, *J. Geophys. Res.*, **2012**, 117, D04302, doi: 10.1029/2011JD016573.

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