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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A Tropical West Pacific OH minimum and implications for stratospheric composition" *by* M. Rex et al.

Anonymous Referee #3

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Rex et al: At tropical West Pacific OH minimum and implications for stratospheric chemistry

Synopsis. A series of intriguing observations of near zero tropospheric ozone profiles sampled in the transBrom cruise in the western Pacific is presented. These and ancillary TES ozone readings are used with models to infer (a) a role for halogens in depleting the ozone; (b) a consequent OH minimum in the troposphere. Furthermore, it is argued that the latter has global consequences for the composition of the stratosphere because the western Pacific is a major entry point of tropical air from troposphere to stratosphere.

Comments. The observations are important and are plausible although as the authors note, there is uncertainty in some of the low-ozone measurements. The early 90s CEPEX cruise supports the low ozone data and there were even observations of such in 1970s aircraft experiments (GAMETAG). On this basis one recommends having the paper published. There are two likely deficiencies with the results. (1) Although as the authors point out, ECC sonde background currents in fight have not been measured, using a value of zero does not make sense. Running the sonde for minutes to an hour or two, is likely to lead to a declining current but not suddenly with launch, more likely asymptotically. From discussions with multiple researchers affiliated with the CEPEX data, there is no consensus that the near-zero data in Kley et al (1996) are erroneous. Note also that the Voemel and Diaz paper referred to is based on a very small number of lab measurements. (2) Assuming that the near-zero ozone cruise results here are correct, the remaining analysis, sets of steps and assumptions, leading to conclusions that the perturbed chemistry is global and is responsible for changes in global warming patterns over the past decade is highly speculative. The main deficiency is that nothing is presented that proves that the unique chemistry of the western Pacific dominates the entire ozone photochemical balance of the lower stratosphere. It is asserted in several places in the paper but not proven. The authors should better support their conclusions and also quantify uncertainties.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 28869, 2013.