

Interactive comment on “Observational evidence of EPP–NO_x interaction with chlorine curbing Antarctic ozone loss” by Emily M. Gordon et al.

Anonymous Referee #1

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The article presents observational evidence of an indirect buffering effect of EPP on the Antarctic ozone loss in spring, by examining multiple satellite datasets. The observations reveal increases in ozone during high geomagnetic activity anomalies, which descend over the spring, and these anomalies are modulated by the QBO, such that they are only observed in years when equatorial winds at 25 hPa are easterly. Corresponding anomalies in ClO and ClONO₂ support the mechanism proposed. The paper is clearly written and the results are of high interest. I only have minor comments that should be addressed before publication.

General comments

- Section 3.1. The discussion of Figure 2 does not highlight a feature that seems quite outstanding to me: there is a dipole of descending anomalies (negative above posi-

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tive) in ozone linked to high Ap and easterly QBO. Does this dipole imply an upward displacement of the region of ozone loss in the presence of high Ap? The focus is on the positive anomalies in the lower stratosphere in November, which results in strong column ozone anomalies. But I think it is worth highlighting and interpreting the negative anomalies above. Also, the anomalies in Fig. 1 are described one by one but a comprehensive view is missing. For instance, the anomalies in November and December are examined separately but they clearly show a continued pattern, highlighting the mentioned dipole. This pattern linked to Ap is also seen in August-September, and disappears in October when the signal is dominated by the QBO.

- Fig. 5A: There is a clear outlier in the wQBO points, with a very low polar O₃ value. Does this influence the results? It is mentioned in Section that some years corresponding to rare extreme events are not considered. Is the polar vortex that winter extremely strong or long-lasting? Should this year not be considered?

Specific comments

- L165: It is not specified in which month you select the sign of the QBO. In Table 1 it is stated that it is May. Why pick the sign of the QBO in May, when your analyses focus on August-December?

Technical

- Introduce what is Ap in abstract (L6) - L110 : remove ‘?’ - L122 (also other places throughout the text, L181, 264, 266, Fig. 5a) : gradient of the trend → this expression is confusing, it should be the slope of the regression, or simply the trend - L203: ‘reduction’ should be ‘increase’, if I understand correctly - L311: ‘won’t’ → will not - L372: ‘and’ is in italic format

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