

***Interactive comment on “The Arctic vortex in
March 2011: a dynamical perspective” by
M. M. Hurwitz et al.***

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We kindly thank this referee for his/her comments. Our responses directly follow each comment:

> My one suggestion is to expand the analysis of SST correlations in a more systematic manner, because this is a new and interesting result (and the paper is quite short as-is). I might suggest showing a time series or scatter plot of observed SST's vs. polar vortex temperatures (and/or heat fluxes), to demonstrate the strong overall correlations (stated at > 95% significant).

We have added a scatter plot showing January/February SST anomalies in the North Pacific vs. March polar cap temperature at 50hPa (Figure 2, right).

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> How do these relationships vary over different months during winter/spring?

100hPa eddy heat flux and polar lower stratospheric temperature are well correlated throughout the mid- and late winter, with a 1-2 month lag. The correlation between North Pacific SSTs and polar lower stratospheric temperature is strongest for January/February (SSTs) and March (stratospheric temperature). The correlation between North Pacific SSTs and lower stratospheric temperature is weaker in early and mid-winter, because other modes of variability (particularly ENSO and the QBO) are dominant. We have just completed a set of GEOS CCM simulations that isolate the role of North Pacific SSTs on the Arctic stratosphere in winter.

> One other suggestion might be to include a map of the polar ozone and/or temperature anomalies in the discussion up front (as Fig. 1), to help readers get an appropriate perspective for the statistics (shown in the current Fig. 1). I realize similar figures will likely be published elsewhere, but it would be useful to place the current work in physical context.

In the revised manuscript, we refer readers to the detailed analysis of Arctic ozone during the 2010-2011 winter by Manney et al. (2011).

Manney, G. L., Santee, M. L., Rex, M., Livesey, N. J., Pitts, M. C., Veefkind, P., Nash, E. R., Wohltmann, I., Lehmann, R., Froidevaux, L., Poole, L. R., Schoeberl, M. R., Haffner, D. P., Davies, J., Dorokhov, V., Gernhardt, H., Johnson, B., Kivi, R., Kyro, E., Larsen, N., Levelt, P. F., Makshtas, A., McElroy, C. T., Nakajima, H., Parrondo, M. C., Tarasick, D. W., von der Gathen, P., Walker, K. A., and Zinoviev, N. S.: Unprecedented Arctic ozone loss in 2011, *Nature*, doi:10.1038/nature10556, 2011.

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