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Atmospheric Chemistry and Physics Discussions

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

Anonymous Referee #1

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This paper aims to examine dynamical behavior associated with the low Arctic ozone during March 2011. Results show that the low ozone was linked with cold vortex temperatures, low heat flux (dynamical forcing), and a delayed break-up of the vortex in springtime, and very similar behavior was observed for the anomalous low ozone conditions during March 1997. The authors examine systematic effects of ENSO and the QBO, and show that neither of these factors contributes significantly to the March 2011 behavior. However, significant effects are suggested to occur due to anomalous sea surface temperature (SST) in the North Pacific ocean, and the latitude-height pattern of composited temperatures for this mode is similar to observations during March 2011 (and also March 1997, when SST's were also high).

I think this paper addresses an important topic, and presents novel and interesting

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results that are appropriate for ACP. The analysis is simple and straightforward, and the paper identifies a new important mechanism for Arctic vortex variability (namely, North Pacific SST's). This result is consistent with recent analysis of model results, and is physically reasonable. 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). How do these relationships vary over different months during winter/spring?

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.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 22113, 2011.