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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Central Arctic atmospheric summer conditions during the Arctic Summer Cloud Ocean Study (ASCOS): contrasting to previous expeditions" *by* M. Tjernström et al.

Anonymous Referee #1

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Review of "Central Arctic atmospheric summer conditions during the Arctic Summer Cloud Ocean Study (ASCOS): Contrasting to previous expeditions" by M. Tjernström et al.

Recommendation: Minor revisions

The manuscript describes the synoptic-scale meteorology and its climatic anomaly during the ASCOS field experiment in summer 2008 and compares key meteorological variables, their vertical structure and energy fluxes at the surface with similar observations obtained during three similar experiments during AOE-1996, SHEBA-1998 and AOE-2011. This is a worthwhile study and I recommend to accept it for publication

after my below comments have been addressed by the authors.

Major comments:

1. The motivation deals mainly with the role of the Arctic in global climate system but the authors are presenting snapshots over a relatively short time period and a small region along the trajectory. How this fits together? I recommend to discuss the value of the presented observations on shorter meteorological time scales.

2. In the introduction the authors claim the need to interpret process-level observations within the context of larger-scale atmospheric circulation. Therefore contour plots of means and anomalies should be provided with a characterization of 2m temperature, 10 m wind, MSLP and 850 and 500 hPa geopotential heights for all four experiments.

3. An assessment of the synoptical (spatial and temporal) characteristics of all four experiments is needed. How similar were the atmospheric and sea ice conditions during the four experiments with respect to climatological conditions? Were the presented data collected at the experiments field site representative of a larger spatial area and if how big is the correlation radius?

4. The apparent differences in figures 10-15 between the four experiments should be discussed with respect to the baroclinic situations during these experiments. I suggest to discuss the baroclinic wind shear and the Brunt-Väisälä frequency.

5. The presented figures deliver important informations, but the origin of the differences in Figures 10-19 with respect to sea ice/ocean state and synoptic-scale forcing/baroclinicity needs to be quantified.

6. What this study can contribute to understand and quantify feedbacks in the vertical under the influence of varying synoptical forcing conditions and different lower boundary effects connected to sea ice or open ocean?

Minor comments:

1) Page 9, LN 22, wind analyses at 10 m?

2) Page 10, LN 11, trajectories based on ECMWF operational analyses with which time, vertical and horizontal resolution?

3) Page 10, LN 27, explain subjective analysis of passing frontal disturbances.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 4101, 2012.