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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Airborne lidar measurements of surface ozone depletion over Arctic sea ice" *by* J. A. Seabrook et al.

Anonymous Referee #2

Received and published: 15 February 2013

Review of Seabrook et al. "Airborne lidar measurements of surface ozone depletion"

This paper presents the results of a flight of a research aircraft which flew from Barrow Alaska over the Arctic ice in 2011. Carrying a differential absorption lidar, the aircraft observed a shallow layer of ozone depletion between 30 and 325 miles offshore. The in-situ observations from the aircraft were consistent with an ozone depletion event.

Ozone depletion over the Arctic Ocean is not a new finding. The use of DIAL from an aircraft is rare in the Arctic and this event needs to be documented. The paper is worthy of publication with few changes.

This reviewer notes that the conclusions are based on HYSPLIT trajectories in a very data sparse region. As such, questions of the airmass history can be drawn from the

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accuracy of HYSPLIT in the high Arctic. Nevertheless, the story seems to hold together from the observational data.

The authors may not be aware of MODIS imagery of this date showing a large open water area in the region they studied. They may wish to refer to:

http://lance-modis.eosdis.nasa.gov/cgi-bin/imagery/single.cgi?image=crefl1_143.A2011092212500-2011092213000.250m.jpg

Perhaps putting the flight track on this image (rectified) would be instructive as to the argument of open water releasing the bromine compounds involved in the ozone depletion.

Specific Comments:

Page 1436 line 22 and 23: why is bromine capitalized here and not elsewhere?

Page 1438 line 4: extinction is scattering plus absorption not just scattering. There is also up to perhaps 10% of the extinction for aerosols which is absorption related, especially in the Arctic where black carbon is an important component of the aerosol. It may not matter for DIAL where this cancels out, but it should not be misstated.

Pg 1441 line 25: Arctic should be capitalized.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1435, 2013.

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