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Atmospheric Chemistry and Physics Discussions

Interactive comment on "First-year sea-ice contact predicts bromine monoxide (BrO) levels better than potential frost flower contact" *by* W. R. Simpson et al.

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This comment is a partial reply to the reviews that have been submitted with regard to the Bottenheim and Chan [2006] reference mentioned by both reviewers.

The recent report of Bottenheim and Chan [2006] was unknown to us at the time of submission of this manuscript. We have subsequently read that paper and find strong evidence in Bottenheim and Chan [2006] that ozone depleted airmasses arriving at Barrow correlate well with regions of first year ice (FYI). In their paper, they describe "cold spots", which are source regions, identified by a back-trajectory analysis, of ozone depleted airmasses that are detected at fixed locations (Alert, Barrow, and Spitzbergen). The Barrow analysis (Fig. 2b) clearly shows that the sea ice north of Barrow is a

stronger source than the polynya areas (the coasts of Russia and Canada, near Banks island), in agreement with our finding that FYI regions appear to be regions where halogen activation (and ozone depletion) occur.

Although our report is specifically about airmasses impacting Barrow, we can look to the Bottenheim and Chan work to look at other regions of the Arctic. In the Alert analysis (Fig. 2a) of Bottenheim and Chan [2006], we see that the sea ice near the Canadian side of the North pole is a weaker "cold spot" for ozone depletion than is the Russian side. This pattern matches the fact that the Russian side has first year ice, while the Canadian side has multi-year ice. The composite picture of ozone depletion shown in Fig. 2d of Bottenheim and Chan [2006] ignores the source of ozone depleted airmasses impacting Barrow, and thus is not a complete picture of ozone depleted airmasses. Of course, trajectory analysis based upon three receptor locations around the Arctic is not fully complete, but we see no reason to discount the Barrow data from Fig. 2d. If the Barrow data were included, the source region of ozone depleted airmasses for the Arctic would be an excellent match to the first year ice areas (essentially the Russian and Alaskan sectors, and less in the Canadian sector). Therefore the Bottenheim and Chan [2006] data appears to provides a match between FYI and ozone depletion.

Bottenheim JW, Chan E, A trajectory study into the origin of spring time Arctic boundary layer ozone depletion JGR-D 111 (D19): Art. No. D19301 OCT 3 2006.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 11051, 2006.