

## ***Interactive comment on “Cyclone-Induced Surface Ozone and HDO Depletion in the Arctic” by Xiaoyi Zhao et al.***

**Anonymous Referee #1**

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Xiaoyi Zhao et al., focus on two cyclone-induced surface ozone depletion events (ODE) at Eureka, Canada and make connection between ODE and HDO depletions by using ground-based, satellite, and reanalysis datasets. They explain the formation of bromine-enriched SSA from blowing snow processes. In addition, they compare modelling results with their measurements and use FLEXPART to find the potential emission sources. In general, this study is relevant for ACPD/ACP and can help to improve our understanding of ODE process in the Arctic. Making a better connection between SSA and ODE in the introduction could be useful.

Aerosol aloft is necessary, but not sufficient for BrO to distribute vertically (see Simpson et al 2017, ACP). The authors explained the ODE and Br reactions, but it can be interesting if they can add more information about Ozone depletion and the chlorine

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radical, too (Custard et al. 2016, ES&T; Custard et al. 2017, ACS Earth & Space Chem).

Equation (2): Are  $\delta^{18}\text{O}$  changes in  $\delta\text{D}$  and  $\delta^{13}\text{C}$  changes in water vapour mixing ratio?

Page 8 line 9: What is the linear relationship between each pair of the three variables? Can you mention that?

For fig. 1, showing the height in the vertical axis is better.

In fig 1a: what are  $\delta\text{D}$  values for 3rd and 4th of March?

Explain fig 5 more: Is it for 2007? Can you add a plot for 2011 too? Also, why do the model and measurement data disagree in fig 4? Have you measured snow salinity to report here?

Page 2 line 29: ice-covered Page 13 line 10: extremely

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