We are thankful for the referee#1's great comments. Please see below: a point-to-point response to the comments (in *italic font*).

1. Lines 40-42. Among the sources of sulfate, the volcanic is not reported here. In north hemisphere, and especially in Iceland, the presence of volcanoes and fumaroles can furnish a contribution to SO2 budget.

   *Yes, volcanoes and fumaroles do contribute to global atmospheric sulfur budget. It is believed that they contribute to 5 – 7 % of global total sulfur emissions. In the manuscript, we had mentioned the main sources during the Arctic summer. However, we have now added the geological sources as well, to make a general statement. Here are the modifications to address this comment:*
   *(Line 41-42): Sulfate aerosols in the Arctic atmosphere originate from the anthropogenic, sea salt, geological and biogenic sources*
   *(Lines 45-46): The geological sources include $SO_2$ emission such as from volcanoes and Smoking Hills (Yang et al., 2018; Rempillo et al., 2011).*

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2. Line 207. CLIM11 instead of CLIM1

   *Thanks, we fixed that.*

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3. Lines 229-232. Here the sampling height (of mean height) of sampling has to be reported. As reported below in the paper, this information is useful as the DMS concentration depend to the height of sampling.

   *Great point. We agree that the sampling heights need to be mentioned, since DMS concentrations change with the altitude. We added the sampling heights: (Line 230): 50 to 5000 m above the mean sea level.*
   *Please note, as mentioned in the manuscript, more details about the observation methods/sampling heights are reported in Ghahremaninezhad et al., 2017.*

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4. Lines 364-365. This sentence is not clear, what is clear from figure 8b is that the difference between DMS results from CLIM11 with and without HS+HB DMS(aq) are very low.

   *We revised the sentences (Lines 363-369) to make the point clear: However, the results from our sensitivity test do not seem to support their findings. As seen from Figure 8b, the enhancement in DMS(aq) in the Hudson Bay system (HB+HS) caused a very small change in modelled DMS(g) along the Amundsen path.*
   *The July mean difference in modelled DMS(g) mixing ratios with and without the HS+HB DMS(aq) enhancement indicates up to 500 and 250 pptv increase of DMS(g) in Hudson Strait and Hudson Bay,*

*respectively. However, the impact of the Hudson Strait and Hudson Bay system is rather locally confined during the study period (Fig. 9b), indicating either short DMS lifetime and/or inefficient transport.*

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5. Lines 460-463. The size discrepancy between model and observation could be due to the effect of MSA in nucleation processes that is not considered by the model. A sentence or a very short discussion on this effect could be add here.

*Great point. We agree that the role of MSA in formation of new particles could affect the aerosol size distribution. We added a sentence to address the concern (Lines 464-466): In addition, the size discrepancy between model and observation could be due in part to the role of MSA in the nucleation/growth of particles which is not considered in this modelling study.*