

The authors thank the reviewer for the highly recommendation of this paper. In the following, we address the only issue raised by the reviewer:

R2.1: I recommend that the authors refine the paper by emphasizing in a more transparent manner the key findings of the study – that is, identification of a concise reaction mechanism that may govern Arctic ODEs (from a more complex reaction mechanism) via a multiphase/box model approach, which in turn saves computational time.

A2.1: Thanks a lot for the suggestion that the motivation of our present research should be discussed more clearly. Thus, we have improved the introduction section, especially explaining more why we did this study and how our findings can help to improve the current understanding of the ODE. Please see **lines 4-8 in page 6** of the revised manuscript.