Response to Anonymous Referee #3

We would like to thank the reviewers for their effort. Responses to reviewers comments are identified below in BOLD and reference changes we have made to an updated version of the manuscript.

A comprehensive study of the clouds over the Ross Ice Shelf and the Ross Sea is presented. Clouds are analyzed for different seasons and classified into types in order to identify relationships with synoptic fields of temperature, humidity etc. The manuscript shows some interesting results and can be published after minor revisions.

Line 162: I am a bit puzzled by the statement "Reported cloud phase is restricted to ice for cloud base temperatures below − 38.5 C, and mixed phase or liquid for temperatures above +1 C". I would have expected mixed phase clouds between -38.5∘C and 0∘C and liquid clouds above 0∘C. Could you clarify?

We would like to thank the reviewer for identifying this error. We believe that replacing the original sentence with the following sentence rectifies this issue.

"Reported cloud phase is restricted by cloud base and cloud top temperature. For cloud base temperature below − 38.5 °C, only ice cloud is permitted. For cloud base temperature between -38.5 and 1 °C, all phases are permitted (liquid, ice and mixed). For cloud base temperature above 1 C, the cloud is classified as liquid when cloud top temperature is above -7 °C, liquid or mixed when the cloud top temperature is between -38.5 and -7 °C or mixed for cloud top temperature below -38.5 C (Wang et al., 2012)."

Reference:
Wang, Z., Vane, D., Stephens. G, and Reinke, D.(2012), Level 2 Combined Radar and Lidar Cloud Scenario Classification Product Process Description and Interface Control Document, Version 1, JPL document.

Line 225: "Comparison between the three products is generally rather good" - this is a subjective statement which should be replaced by something quantitative.

We agree that this is a subjective statement, but it was meant as a high level generalisation, we suggest the refined wording below would improve this:

"A visual comparison between the three products generally shows good agreement (within a few percentage points)."

Line 438: I wouldn't have expected deep convection to be the predominant cloud type in the Arctic. Maybe this is simply a misnaming for a vertically extended cloud?

We use the Deep Convection identification used in the 2BCL4 dataset. We agree that this may not be the best description in the Antarctic, but feel it is important to remain consistent with the dataset definitions. We have added the line:

"This cloud type is likely identified due to large horizontal and vertical extent of the cloud rather than presence of deep convection in the polar region."