This paper on the potential use of X-band Co-Polar phase difference (CPD) for snow depth estimation expands the previous research done in this field and is the first to investigate this relation in Herschel Island in Canadian Arctic. The article concludes that the method is useful when the copolar coherence is above 0.5, the study area has less than 10% slope with X-band acquisitions that are obtained greater than 30 deg. incidence angles. The study also leverages Topographic Wetness Index derived from a 2m-resolution DEM, and suggests good results can be achieved TWI>7. The results also indicate that the technique does not provide useful results on arctic fresh snow. Despite all the limitations, the study indicates statistically significant correlation in 4 out of the 15 test cases with varying vegetation cover and satellite orbits (Figure 6).

Overall, the paper is a good contribution to the scientific knowledge and with some clarifications it can be published.

Below are some comments with the line number indicated at the beginning of a comment.

Line 58: "The main challenge related to the use of SAR is the lack of a reliable method to relate satellite data to physical measurements in snow impacted environments." Would the authors be able to expand on why they see other SAR based methods unreliable? Some studies to provide examples:

Alternatively, the sentence can be reworded to clarify the intended meaning.

Line 185, Figure 3: Please consider adding a map of the TWI to give the readers that are unfamiliar with the area an understanding of how it varies over the study area.

Line 210: Were the CCOH calculated directly from the 5m resolution Kennaugh elements?
If so, isn't it a biased estimator at that resolution? For reference Leinss et al. 2014, was using an averaging window of about 75m.

No-Line: Given that the CPD = 2\*pi*SD/wavelength*birefringent_refractive_index, and that the birefringent_refractive_index is about 1deg/cm of snow per Leinss et al., 2014, wouldn't there be cases where phase unwrapping may be needed for deep snow (~ >180cm)? If so, how was this handled? If not, why was it not needed?

No-Line: Have the authors considered the phase noise of TanDEM-X sensor ( +/-3.5 deg Leinss et al., 2014) in their uncertainty analysis? If not, why was it not needed?

Minor:
L93: "randomly phase shifts"
Consider "randomly shifting phase"
L122: "reach over a 110 cm"
Consider "reach over 110cm"
L412: " hummocky area "
consider "hummocky areas"