Accurate SWE estimate from satellite is critical for hydrological and climate modelling. InSAR SWE estimation technique as the potential to offer SWE at the required resolution (spatially and temporally) but further investigation is necessary. This works offer insight on the challenges of this technique using C-band data from Sentinel-1. Similar to the work in (Oveisgharan et al. 2024) Lidar and Snotel sites are used to evaluate the retrieval at several sites in the Western US. The paper would benefit from clearly stating what is the difference between this previous work. At first glance, it looks similar even though the analysis goes further in the parameter affecting the temporal coherence.

I think focus on the soil background is missing on the analysis on the temporal coherence. It seems that the C-band decorrelation would highly be link to changes in the soil background (Tampuu et al. 2020, Ouaadi et al. 2024) since the soil is probably not frozen. A 6-days revisit seems to also be crucial in coherency (Ouaadi et al. 2024). This not good for NISAR since the revisit is 12 days. However, L-band seems to be less sensitive to decorrelation from the ground, and a 12-day revisit is probably fine. I suggest discussing this because someone could easily conclude that this method won't be successful with NISAR because of the revisit time.

Specific comments:

L11: The main driver is temporal coherence followed by temperature, wetness… Those factors affect the coherence as well. So it's still the same driver? Maybe rephrase.

L22: "shifting snow accumulation toward higher". Is it really shifting the accumulation or just lowering accumulation down south?

L25: Suggest modified to "if the snowpack completely melts"

L31: I think the resolution of GlobSnow is still 25km.

L48: If the ratio picks up volume scattering, an incoherent process... then this would contribute to losing coherency faster at C-band than L-band due to volume scattering. I don't think it's the case, but I think it needs to be mentioned at some point.

L55: I would specify microstructure here. Stratigraphy (permittivity changes) is also "layering" which is what you want here.

L60: How is this different than Oveisgharan et al., 2024? Stating the difference here would be nice because it looks really similar at first.

L72: True at C-band and L-band. I would be precise here

L76: Suggest changing "dual-polarization dual-frequency retrieval approaches" to "intensity based-approaches"

L124: freeze/thaw or soil permittivity change of the ground could change the backscatter response.

L129: Can you explain why?

L135: Would be nice to mention quickly how temporal coherence is calculated even if its just a reference.

L163: Are comparing the depth for lidar and InSAR at every 5m for each site?

Figure 10: It seems like soil moisture content would highly impact the temporal coherence at C-band. This effect seems to be less of a problem at L-band.

L357: “increase particle motion” Do you mean water percolation?

L374: NISAR is a 12-day repeat cycle, and you just said its bad for coherence…

Reference

Oveisgharan, S., Zinke., R., Hoppinen, Z. and, Marshall, H. P. Snow water equivalent retrieval over Idaho – Part 1: Using Sentinel-1 repeat-pass interferometry. The Cryosphere, https://doi.org/10.5194/tc-18-559-2024

Tampuu, T., Praks, J., Uiboupin, R., & Kull, A. (2020). Long Term Interferometric Temporal Coherence and DInSAR Phase in Northern Peatlands. *Remote Sensing*, *12*(10), 1566. https://doi.org/10.3390/rs12101566

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