Review of the manuscript egusphere-2025-276 entitled "Scale patterns of the Sentinel-1 SAR-based snow depth product compared to station measurements and airborne LiDAR observations" by Ying et al.

This article conducts a thorough evaluation of the multi-scale performance of the Sentinel-1 SAR snow depth product, offering notable value in data validation and environmental impact analysis, with clear figures and fluent expression. However, its focus on validating existing algorithms rather than achieving a breakthrough limits its innovation, and certain language expressions lack smoothness. It is recommended that the manuscript be revised prior to submission for publication.

#Major

1. Although the article systematically evaluates the C-snow product across multiple scales, its core methodology—such as the C-band SAR-based snow depth retrieval algorithm—is not original to this study but builds upon prior work by Lievens et al. (2019). The innovation here lies primarily in data validation and scale analysis, yet these aspects do not represent a novel breakthrough in the field of remote sensing. It is recommended that the study explicitly highlight its unique contributions, such as whether it proposes a new scale-effect model or an improved retrieval method.

2. The introduction provides a detailed review of the development of SAR and microwave remote sensing in snow depth monitoring but fails to adequately justify the selection of the 1, 10, and 25 km scales for analysis or clarify their relevance to practical applications, such as hydrological modeling.

#minor

1. Lines 20-21: Sentence is too long. "The results indicate that the scale patterns of the C-snow products across various resolutions differ from those of station- and airborne-based reference data." → "The scale patterns of C-snow products vary across resolutions. They differ from patterns observed in station and airborne reference data."

2. Lines 366-367: The text contains redundant expressions, and optimization is recommended. "bias values ranging from -91.31 to -52.73 cm and ubRMSE values ranging from 104.3 to 83.29 cm"→"bias values decrease from -91.31 cm to -52.73 cm, while ubRMSE decreases from 104.3 cm to 83.29 cm".

3. Line 379: analized → analyzed.

4. Suggestions for unified terminology. "ground-based measurements", "station observations".