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Corrigendum to "Snow water equivalent retrieval over Idaho – Part 2: Using L-band UAVSAR repeat-pass interferometry" published in The Cryosphere, 18, 575–592, 2024

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In the manuscript "Snow water equivalent retrieval over Idaho – Part 2: Using L-band UAVSAR repeat-pass interferometry", some elements of the numerator and denominator were inadvertently reversed in Eq. (3) in the section *Setting the reference UAVSAR phase*. The corrected equation is:

$$\phi_{\text{scene}}(t) = -\Delta d_{\text{insitu}}(t)\frac{4\pi}{\lambda}\left(\cos\alpha - \sqrt{\epsilon_s(\rho_s) - \sin^2\alpha}\right) \quad (1)$$

This equation follows directly from the standard formulation of electromagnetic wave propagation between two approximately lossless dielectric layers with the first medium assumed to have a unitary real permittivity.

The two-layer system is defined with the permittivity of the first medium given by $\epsilon_1 = 1$, which is a valid approximation for air. Under this assumption, the first term in the parenthetical of the general expression,

$$\left(\sqrt{\epsilon_1 - \sin^2\alpha} - \sqrt{\epsilon_2 - \sin^2\alpha}\right), \quad (2)$$

simplifies as follows. Substituting $\epsilon_1 = 1$ yields

$$\sqrt{1 - \sin^2\alpha} = \cos\alpha, \quad (3)$$

and therefore the expression reduces to the form shown in the corrected equation with e_2 replaced with the secondary (snow) permittivity. This simplification is a direct consequence of modeling the system as a two-layer lossless problem at the air-snow boundary.

This equation for air-snow is first derived in Guneriussen et al. (2001).

The code implementation was correct, and the relevant lines can be found at: https://github.com/ZachHoppinen/uavsar-validation/blob/main/src/data_acquisition/create/create_netcdfs.py#L342 (last access: 23 December 2025) and https://github.com/SnowEx/uavsar_pytools/blob/main/uavsar_pytools/snow_depth_inversion.py#L157 (last access: 23 December 2025).

References

Guneriussen, T., Hogda, K. A., Johnsen, H., and Lauknes, I.: Insar for Estimation of Changes in Snow Water Equivalent of Dry Snow, IEEE T. Geosci. Remote, 39, 2101, https://doi.org/10.1109/36.957273, 2001.