

Title: Comment on "Technical note: An assessment of the relative contribution of the Soret effect to open water evaporation" by Roderick and Shakespeare (2025)

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## **Review**

This manuscript (comment/reply) is a scientific comment on a recent paper for which I was the first author. The manuscript continues comments made by Dr Kowalski during the review of our 2025 paper and the commentary about the review process of our earlier work is accurately described in the current manuscript.

I think it might be helpful to reformulate the introductory remarks about the comment to make a new reader aware of the full context of the interesting topic raised. I attempt that below.

In their derivation, Roderick and Shakespeare (2025) used molar units and reported that the advective component of the total flux scaled with the mol fraction of water vapour near the evaporating surface. Kowalski (this manuscript and previously) has asserted that the same advective flux scales with the mass fraction of water.

To give a numerical example, assume standard air with water vapour mol fraction equal to 0.02 (i.e., reasonably warm moist air). The equivalent mass fraction of water vapour would be 0.012. The derivation of Roderick & Shakespeare (2025) would make the advective component of the flux equal to 2% of the total (molar) flux. In contrast, the analysis by Kowalski (here and previously) would make the advective component equal to 1.2% of the total (mass) flux. Hence there is a small 0.8% difference between the formulations in the chosen example. We further note that the mass fraction result advocated by Kowalski would always be smaller (by  $\sim 18/29$ ) than the molar based result we used in our 2025 paper.

With this in mind it is important for the author to acknowledge that this small difference makes no practical difference to the conclusions made by Roderick and Shakespeare (2025) in that the Soret component of the total flux is very small as is the advective component. Using the smaller mass fraction result would actually strengthen the original conclusion. This needs to be spelled out clearly in the introduction to avoid confusion by interested readers and to establish the overall context of the comment/reply.

Instead, what the new Kowalski comment/reply points out is an interesting scientific/theoretical discrepancy that he has been active on for many years.

We hope the Kowalski comment invokes further work on this important topic.

## **Reference Cited**

Roderick, M.L. and Shakespeare, C.J., 2025. Technical note: An assessment of the relative contribution of the Soret effect to open-water evaporation. *Hydrol. Earth Syst. Sci.*, 29(8): 2097-2108.

**Michael L. Roderick, 15/7/2025**