

Clim. Past Discuss., author comment AC1
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Reply on CC1

Bradley R. Markle and Eric J. Steig

Author comment on "Improving temperature reconstructions from ice-core water-isotope records" by Bradley R. Markle and Eric J. Steig, Clim. Past Discuss.,
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Thank you for this suggestion; we were aware of this important study, but only after submitting our manuscript. We have included these important first-principles based formulations for the temperature dependence of diffusivities and ϕ_{diff} as an option within our model and discuss them in the text. As the reviewer correctly inferred, this does not make an appreciable difference to the main results of this study. When the new physically-based temperature dependencies are included, we must still choose the exponent “ n ” in the evaporation scheme (which was avoided before by using an empirical “effective” α_{diff}) as well as tuning the supersaturation function within the distillation scheme. In conducting sensitivity tests we find that the temperature dependence of the diffusivities makes very minor differences in both the evaporation and distillation results, and are subsumed within the range of uncertainty in our supersaturation function and, in the evaporation scheme, a small range of “ n ” becomes equivalent to the small range of α_{diff} . We have included discussion of these findings in the text. We appreciate the consistency and connection to first principles of the physically based temperature dependence suggested here, though they make little difference to the ultimate results of this particular study.