

Interactive comment on “Numerical framework and performance of the new multiple phase cloud microphysics scheme in RegCM4.5: precipitation, cloud microphysics and cloud radiative effects” by Rita Nogherotto et al.

Anonymous Referee #3

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The paper introduces a needed update to the moist physics in the RegCM4 community regional climate model, namely the inclusion of ice phase microphysics. Given the wide use of RegCM4 it is likely that this paper will be heavily referenced. The paper is well written and there are only a few minor changes needed to clarify and strengthen it.

1. There are many microphysical schemes in existence, some of which are more detailed than the scheme here and some less. It would be appropriate to discuss briefly the rationale for choosing this particular scheme for inclusion in RegCM4 compared to other options.

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2. At line 68: Is there no rainwater evaporation in SUBEX?
3. Are any of the parameters in the new scheme known or suspected to be sensitive to grid spacing? Intuitively it would seem that some of the parameters (such as those in Equation 5) should approach limiting values for very small grid volumes and as such their most appropriate values could vary with grid spacing.
4. Line 195, "condensate" should be "condense."
5. The RHS of equation (12) simply works out to D , since $\alpha + (1-\alpha) = 1$. This does not seem correct. Are there missing subscripts or other corrections needed?
6. Line 205, regarding the four different autoconversion parameterizations: Are these user-selectable, or are different parameterizations invoked automatically by the scheme depending on the physical conditions?
7. Equation (14), the species for which q_l and q_{crit} apply should be clarified. Typically the rate on the LHS applies to precipitation and the humidity on the right-hand side is cloud water, but this equation has q_l on both the LHS and RHS implying a positive feedback (which seems unusual).
8. Line 244, The reference on IFS documentation does not appear in the list of references, or at least not under that title. Please give sufficient bibliographic information so that the reader can access this document.

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