

Interactive comment on “Beyond Craig and Gordon: A model of water vapor isotopologues in the marine boundary layer” by Xiahong Feng et al.

Anonymous Referee #2

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In the manuscript by Feng et al. a model is presented to explain the marine boundary layer water vapor isotopic composition. The authors present this as a step forward from the initial model developed more than half a century ago by Craig and Gordon.

This manuscript fails to demonstrate the usefulness of their new model to understand processes in the marine boundary layer. The authors show that they can explain the marine boundary layer water vapor isotope observations using different configurations of the parameters in their model, but they do not reflect upon what this means for our understanding of the atmospheric physical processes. To warrant publication the authors should make it clear to the reader what their model can be used for. Simply using some ad-hoc parameters to show that the model simulate observations does not expand our knowledge and understanding of the world that we live in. Specifically, the

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authors should make it clear which research questions they are going to answer in this manuscript.

The authors fail to discuss developments in the use of water isotopes to understand marine boundary layer processes over the last decade. It would be an important step for potential publication of the manuscript that the authors discuss in the introduction how their new work relates itself to recent work and not just work by Craig and Gordon 1964 and Merlivat and Jouzel 1979.

The model is presented here as relieved of the need for empirically chosen values of the kinetic fractionation factor such as the k -factor in the work of Merlivat and Jouzel 1979. Instead the model introduces assumption of linear increase of diffusion from the surface to a specific height above the layer (the authors refer to this as the thickness of the von Karman layer). It is unclear in the manuscript what theoretical background or empirical observations the authors have for choosing the value of the turbulent diffusion coefficient at the interphase of the von Karman layer and convergence layer, and what foundation the authors have for deciding that the diffusion is linear in the von Karman layer. It seems that the authors replace one ad hoc parameterization with another ad hoc parameterization.

As such the manuscript could potentially be publishable, but the authors should present the manuscript for what it is: Another model of water vapor isotopologues in the marine boundary layer and not as the title suggest something which goes beyond Craig-Gordon. The text should also represent this more realistic goal of being one model among many others. Finally, the manuscript should clearly outline, why this model is useful. This could be achieved by formulating clearly outlined research questions, which the model is used to answer.

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