

## ***Interactive comment on “Craig-Gordon model validation using observed meteorological parameters and measured stable isotope ratios in water vapor over the Southern Ocean” by Shaakir Shabir Dar et al.***

**Anonymous Referee #2**

Received and published: 2 March 2020

The submitted paper by Dar et al presents an analysis of isotopic data from southern latitudes. These data are compared with a set of models and associated coefficients. While worthwhile, a revision of the structure and error analysis of conducted here would greatly improve this submission. First, the overall structure of this paper is a bit jumbled. Much of the discussion material about the CG models should be moved into the methods section. Similarly, the discussion of how the HYSPLIT back trajectories were ran should also be described in the methods section. Second, the error analysis needs to be more fully documented. The testing of different model formulations and

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parameters is helpful, however the authors do not fully evacuate the errors and biases associated with each model. A more rigorous description of errors across all variables is needed. Finally, is there an optimal set of an parameters that others should use (i.e. what value of  $x$  and fractionation factors minimizes errors and bias)?

L4: Add latitudes numbers here. L5: Reword the sentence that starts “The inter annual”, its not clear what your trying to say L19: Nearly and your double tilde are redundant. L25: Missing an ‘A’ at the beginning? L52: Define what you mean here by boundary later? Where these really at the boundary layer? L65: This text on HYSPLIT methods should move to section 2. L76: Careful with your terminology here. A positive delta value signifies that it was more enriched in heavy isotopes relative to VSMOW only. L110-L120 What are the significance and or uncertaintie3s of these regressions. L132: Why not put the regression coefficients and stats from Figs 5 & 6 in a table L143-201: This needs to all move to methods. L197: Please directly state the numbers you used here for the diffusivities L209: While differences between the slopes and intercepts are interesting, a more error though analysis should be conducted. What is the overall bias associated with each model, what are the root mean squared errors, etc.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-950>, 2019.

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