

Interactive comment on “A mass-weighted atmospheric isentropic coordinate for mapping chemical tracers and computing inventories” by Yuming Jin et al.

Anonymous Referee #2

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This paper describes a new physically based atmospheric coordinate as an alternative to the latitude coordinate that is helpful in interpreting temporal and spatial variations of long-lived atmospheric tracers. The paper is well written, and I recommend publishing after the following minor comments are addressed.

General comment: The surfaces of M_{θ_e} need to be better described. The definition of M_{θ_e} , given in Eq. 2, results for e.g. the northern hemisphere in a mass of a volume that encloses the north pole, reaches from the surface to the dynamical tropopause, and has as a southern boundary a specific θ_e surface. So the surface of this volume is more than just the southern boundary, and a statement

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like “ M_{θ_e} surfaces are always exactly parallel to θ_e surfaces” is difficult to understand in this context. Bins of M_{θ_e} in this context represent quasi differential volumes, which are more similar to surfaces of M_{θ_e} . This should be explained more clearly. May be a 3-D visualization of the complete surface of a given M_{θ_e} volume for a specific date would help illustrating this, but I’m not sure how much distortion there would be due to synoptic disturbances that could make the volume and its surface unrecognizable.

Specific comments:

L1: The term “inventories” in the title and throughout the manuscript is a bit misleading, as it might be mistaken as e.g. emission inventories. May be the authors can use a different term such as atmospheric abundances or atmospheric burden.

L199: “Since” use lower case

References: please add a doi wherever possible (e.g. Parazoo et al., 2008 is missing the doi)

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