

2<sup>nd</sup> review of paper

## **A unified framework to estimate the origins of atmospheric moisture and heat using Lagrangian models**

by J. Keune et al.

submitted to *Geosci. Model Dev.*

Thanks to the revisions this became in my view an excellent paper that is innovative, well written and of great value for the growing community that cares about diagnostics of moisture and heat sources. I congratulate the authors to this comprehensive and important study and recommend accepting the paper with only very few corrections. In particular, I very much like the introduction and the clear and detailed description of the methodologies. The idea of the “random attribution method” is now much clearer to me (and an interesting idea!). Also, I very much appreciate the examples shown in Fig. 2 – very helpful!

### **Minor comments**

- 1) Line 13: I don't understand “multi-backward-day trajectories” (the term is also not used/explained in the main part of the paper). Do you mean “multi-day backward trajectories”?
- 2) Line 126: I think all years should be in (...).
- 3) Fig. 1: lowest panels: not fully clear to me what red and blue indicates.
- 4) Line 180: I assume that  $H$  here is heat flux, why is it underlined?
- 5) Eq. 13: potentially confusing to use  $H$  (heat flux) also for the Heaviside function, maybe use calligraphic  $H$ ?
- 6) Line 343: different notation for Heaviside function compared to eq. 13.
- 7) Eq. 17: I assume that  $h$  should be italic.
- 8) Line 416: here and in other places, I think that  $t$  should be italic.
- 9) Line 803: space missing in “diagnosis enables”.
- 10) Line 806: “to use relax detection criteria” sounds strange, either “use relaxed ... criteria” or “relax ... criteria”.
- 11) Line 1020: initials should be only “H.” not “B. H.”.