

Review of “On the mechanisms driving latent heat flux variations in the Northwest Tropical Atlantic: a modelling approach.” By Fernández, Speich, Conejero, Renault, Desboilles, Pasquero and Lapeyre, submitted to Ocean Science/EGUsphere, 2025.

## Summary

The authors have made a very thorough revision and have addressed the majority of my points. I recommend minor revision based on the following:

The response to my original Major Point 1 (Role of humidity in latent heat flux (LHF) variations) is good, but I still have some confusion. Using the downscaling approach, you show that atmosphere specific humidity is the major contributor to LHF variations, because when you do not downscale atmosphere specific humidity (in LHF\_therm and LHF\_therm\_U) the LHF variations are much smaller than when all variables are downscaled (LHF\_HR), Figs. 5c,d.

Re: Fig. 7, you argue that because atmosphere specific humidity anomalies ( $q_a$ , Fig. 7d) near the surface do not closely follow  $q_{sat}(SST)$  (Fig. 7c), there is a large difference between  $q_{sat}(SST)$  and  $q_a$  (Fig. 7e), (specific humidity deficit in your terminology) hence leading to the LHF variations. In other words you say the specific humidity deficit is large because atmosphere humidity variations are small, but it could also be said that the specific humidity deficit is large because  $q_{sat}(SST)$  variations are large.

I believe the standard linearization method for LHF (used e.g. in Tanimoto et al. 2003 and Small et al. 2019) would suggest SST and  $q_{sat}(SST)$  are more important than the small atmosphere specific humidity anomalies for your case. But this would not be consistent with your Fig. 5.

Although I understand your point, I am not certain that it is the fully correct interpretation – but I cannot offer a better alternative at present. Please think about my points (including relationship to linearization approach) and see if they help to make the conclusions more solid. When I worked on the Small et al. 2019 paper I had to deal with complexities such as inter-dependent variables (e.g. humidity depending on wind, etc) – I am not sure if that affects your results.