Author Response to the Editor Comments to the manuscript "Water vapour isotopes over West Africa as observed from space: which processes control tropospheric H2O/HDO pair distributions?" [EGUSPHERE-2024-1613] submitted to Atmospheric Chemistry and Physics.

We would kindly thank the Editor Ann Fridlind and the anonynomus referees for providing a review of the revised manuscript. The individual comments are listed below (shown in red) including our responses (shown in black) and the changes made in the manuscript (shown in black and italics).

Comments

"Section "Author contribution": Please use initials for the authors' names."

Thank you for this note. We have updated the section correspondingly.

"Please bring the abstract into compliance with guidelines for authors:

https://www.atmospheric-chemistry-and-physics.net/policies/guidelines_for_authors.html

Then I will be glad to accept this manuscript for publication."

In alignment with the referred guideline, we have shortened the abstract to 250 words:

"The West African Monsoon (WAM) is crucial for rainfall in West Africa, impacting socio-economic conditions. Its complexity arises from interactions between large-scale circulation, convective dynamics, and microphysical processes, making it challenging to disentangle individual contributions to the hydrological cycle.
Recent advances in retrieving the isotopic composition of tropospheric water vapour from space promote the paired analysis of H_2O and HDO to study atmospheric moisture pathways and processes. Using data from satellite instruments IASI, AIRS and TROPOMI, along the IMERG precipitation product, we analyse the variability of H_2O and HDO (given as δD) over West Africa at convective and seasonal scales. Key findings include:

1. *Monsoon convection over the Sahel induces an anti-correlation between H_2O and δD in the mid-troposphere. This is due to dry intrusions from the Saharan upper troposphere into Sahelian squall lines, fostering rain evaporation and mid-tropospheric δD depletion.*
2. *Over the Guinea Coast, convective precipitation is associated with moist and enriched signals, with surface evaporation from the Tropical Atlantic reducing rain evaporation and δD depletion.*
3. *During the Sahelian monsoon peak, an anti-correlation between precipitation and δD forms year-to-year, indicating the amount effect in tropospheric water vapour.*
4. *In the Sahelian winter, when precipitation is minimal, $\{H_2O, \delta D\}$ signals point to mixing of dry air masses from different origins.*

This study is the first to apply comprehensive isotopic datasets from IASI, TROPOMI and AIRS to the WAM, demonstrating the utility of satellite-based $\{H_2O, \delta D\}$-pairs in detecting impacts of microphysical and dynamical processes on water vapour isotopic composition."