

Turbulent mixing and its impact on lower tropospheric moisture over tropical ocean

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The variability of lower-tropospheric water vapor is a critical feature of the tropical climate. Among the processes that impact moisture budget, the vertical transport by turbulent mixing is generally overlooked. Using observations from CINDY/DYNAMO campaign, this is a first attempt to quantify it over the tropical ocean. Turbulent patches of size of $O(100\text{ m})$ are observed in relation with large vertical gradients of specific humidity. Intense mixing is diagnosed within these intermittent patches. Three approaches are used in order to diagnose the effect of this intermittent turbulence and reveal large uncertainties on the corresponding eddy diffusivity coefficient. The observed dry conditions are associated with steep moisture vertical gradients above the boundary layers. These steep gradients are potentially associated with moisture tendencies on the order of $0.5\text{-}1\text{ g kg}^{-1}\text{ day}^{-1}$ that could play a role in the recovery phase following a dry intrusion or during the preconditioning stage of an MJO.

Keywords: turbulent mixing, lower-tropospheric moisture, CINDY/DYNAMO, tropical oceanic region