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Characteristics of the tropical tropopause layer

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Observations in the tropics suggest a gradual transition from the troposphere to the stratosphere over a vertical layer of a few kilometers thickness. In recognition of its unique characteristics, showing both influence from the troposphere and stratosphere, and its importance for, e.g., troposphere-stratosphere exchange, this layer has been termed the tropical tropopause layer (TTL). However, this TTL is currently not well defined, leading to various definitions of its vertical boundaries, and a lack of a definition for its lateral (meridional) boundaries. We review the atmospheric parameters that support the notion of a TTL, for example tracers such as ozone, and parameters that show interesting behaviour in that region, such as temperatures, clouds, radiation, and isotopologues, in terms of their climatological mean, as well as temporal and spatial variability. Further, we discuss the theoretical considerations that seek to explain the observed characteristics, and strive for a synthesis of observations and theoretical considerations that leads to a well defined TTL.