

Multi-scale observations of upper tropospheric humidity over the Indian Ocean

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The upper tropospheric humidity (UTH) has a strong leverage power onto the greenhouse effect of the whole atmospheric column. It has been suggested to play an important role in positive as well as negative climatic feedback loops. The humidity fields of the tropical and subtropical areas depend on both the source of moisture for the free troposphere, that is deep convection, as well as onto the large scale dynamics transport. Understanding the distribution of humidity in the inter tropical upper troposphere requires dedicated observations at different space and time scales associated with the convection and the circulation respectively. The METEOSAT-5 6.3 microns observations form the basis of our UTH retrieval over the Indian Ocean. The period of study concerns the 1999 winter monsoon. The monthly mean UTH distribution is first presented to highlight the relationships with the Hadley/Walker circulation. The UTH is further investigated at the intraseasonal scale and it is shown that the active phase of the intraseasonal oscillation is associated with a moister upper troposphere and related to an increase in deep convective systems occurrence. The operational UTH retrieval algorithm of EUMETSAT has then been implemented at the full resolution imagery of METEOSAT (5x5km). The smaller scales of the UTH distribution are further investigated in the immediate environment of the mesoscale convective systems in order to show, if any, the difference in upper levels detrainment properties between the organized and the isolated convection. Dry structures are observed in the subtropical free troposphere. Their structural properties are first analyzed and the vertical development of the dry zones is characterized using the SSM/T2 183GHz observations. The temporal evolution of the dry structures properties will finally be presented as the intraseasonal scale.

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