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The Indian monsoon anticyclone water vapour trap

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During Asian monsoon season, the convective flux from the monsoon generates a persistent anticyclonic circulation at the tropopause over the Tibetan Plateau. This period corresponds also to the ‘‘wet phase” of the water vapour annual cycle in the tropical lower stratosphere.

While during that season tropopause temperatures are generally higher, and thus lead to higher entry mixing ratios, the spatial pattern of observed lower stratospheric water vapour mixing ratios , with higher values within the Indian monsoonal anticyclone, cannot be explained by the seasonal variation of tropopause temperatures alone.

It has been suggested (Bannister et al., QJRMS, 2004) that the circulation around the anticyclone transport air southward from the convective region and the cold pool as it rises to the stratosphere. It has also been suggested (Dessler, JGR, 2004) that the stratosphere is directly moistened by penetrating convection. Satellite observations form MLS-AURA reveal a moist anomaly on the north side of the anticyclone which can hardly be explained by any of these two hypothesis. However, this anomaly is not a stationary pattern but undergoes fluctuations on a weekly scale. We investigate the generation and maintenance of this anomaly from back-trajectory calculations and study its variations in relation with the meteorological conditions of the monsoon and the temperature fluctuations experienced by the parcel. We study also the sensitivity of this reconstruction to the wind dataset and mixing parametrisation.