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Convection penetrating the TTL over the Indian monsoon region seen from AVHRRs and MVIRI/Meteosat

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The impact of very deep convection penetrating the TTL on its moisture budget, and the significance for troposphere-to-stratosphere transport is still poorly understood. Here, we present an analysis of deep convective clouds penetrating the TTL during the Indian monsoon season, a unique period when deep convection is both very intense and focused in the India/Bay of Bengal region. We use data from the AVHRR sensors on the series of NOAA satellites together with the data from EUMETSAT's Indian Ocean Data Service to derive the climatology of deep convection over the period 1982-2006 at very high spatial resolution over the Indian subcontinent. We find that during June and July over the Bay of Bengal and the northeastern India about 5% of all clouds reach the TTL. It is observed that these regions experience convection penetrating deeper into the TTL than the Tibetan Plateau, where it is mostly constrained to the bottom of the TTL. This climatological perspective is contrasted with detailed case studies for the years 2002 and 2003, which experienced a very different development of the monsoon, which is also reflected in the changes in the amounts of deep convection penetrating the TTL and tracers. Significance of interannual variability of the Indian monsoon on the structure and composition of the TTL will also be discussed.