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Troposphere-Stratosphere transport in the tropics from CALIPSO lidar aerosols measurements

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Troposphere Stratosphere transport in the tropics from CALIPSO lidar aerosols measurements

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The evolution of the aerosols in the tropical tropopause region is investigated from the CALIOP lidar measurements onboard the CALIPSO satellite. After applying a correction for calibration and appropriate cloud mask, a consistent picture of the aerosols since the beginning of the mission in June 2006 until present is provided. Most remarkable features are the presence of several volcanic plumes at various levels further lifted by the Brewer-Dobson circulation, and the injection of clean washed-out tropospheric air up to 19-20 km particularly intense during the maximum land convective season in February-March resulting in the cleansing of the Tropical Tropopause Layer (TTL). Most important implications relevant to Troposphere to Stratosphere transport is the suggestion of the existence of a maximum static stability layer at about 19.5 km (450 K, 60 hPa) suggesting a decoupling of the circulation between Holton's "lowermost stratosphere" and "overworld", and the importance at global scale of fast convective overshooting of tropospheric air across the tropopause up to the altitude of the above static layer.