



Solid particles in the tropical lowest stratosphere

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We report in situ and remote observations proving occasional occurrence of solid particles in the tropical lowest stratosphere, far away from deep convective events. The particles were found during field campaigns in eastern Brazil. They occur in the altitude range from 17.5 to 20.8 km, at temperatures at least 10 K above the expected frost point temperature. While stability of ice particles at these altitudes is unexpected from a theoretical point of view, it is argued that these observations are indications of tropospheric air masses penetrating into the stratosphere during convective overshoots. In one case it is concluded that the intrusion of tropospheric air must have carried a large amount of water with it, and therefore effectively hydrated the lowest stratosphere.