

A persistent imbalance in HO_x and NO_x photochemistry of the upper troposphere driven by deep tropical convection

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Abstract

Convection in the tropics turns over the upper troposphere at rates (0.08 d^{-1}) comparable to photochemical processes controlling the abundances of HO_x (OH + HO₂) and NO_x (NO + NO₂). Here we identify convection of boundary-layer CH₃OOH as a primary source of HO_x to the upper troposphere. Turnover of NO_x leads to NO/HNO₃ ratios much higher than predicted for local photochemical steady state. Production of ozone in the upper troposphere is greatly enhanced. Through convective transport the upper troposphere is more photochemically active in producing O₃, an important greenhouse gas.

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