

## Solar Forcing, Tropical Lightning Activity, and Upper Tropospheric Water Vapor

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Due to the rotation of the Earth, the surface solar heating in tropical regions has a dominant diurnal periodicity, forcing a clear diurnal cycle in local convective storms, followed by a clear diurnal signal in lightning activity. Furthermore, the maximum lightning activity occurs at different universal times in different locations. Asian lightning activity peaks near 0900UT, African activity around 1400UT, while the Americas peak around 2000UT. The deep convective clouds that develop on a daily basis transport large amounts of moisture into the upper troposphere where the water vapor has important impacts on the Earth's climate. We present evidence showing a strong connection between the daily variability of tropical solar forcing, tropical lightning activity and upper tropospheric water vapor concentrations. Our results over the African continent show that the upper tropospheric water vapor peaks one day after intense solar heating and lightning activity in the tropics.

Price, C., and M. Asfur, 2006: Can lightning observations be used as an indicator of upper-tropospheric water vapor variability? *Bulletin of the American Meteorological Society*, 87, 291-98.