Observational studies of the direct influence of the stratospheric QBO on tropical deep convection, the early years (1961 - 2003)

Matthew HITCHMAN[1]

[1] *Department of Atmospheric and Oceanic Science, University of Wisconsin – Madison, Madison, WI, USA*

An overview of observational studies regarding the influence of the stratospheric quasi-biennial oscillation (QBO) on tropical deep convection is presented. The focus is on the "local" downward influence of the QBO on the troposphere. Physical mechanisms for how the QBO can modulate deep convection are discussed, including the effects of tropopause altitude, vertical wind shear in the upper troposphere / lower stratosphere (UTLS), and the QBO mean meridional circulation, which extends into the subtropics. Observed QBO differences in synoptic patterns of outgoing longwave radiation, highly reflective cloud, tropopause temperature, geopotential height, zonal wind, and vorticity are shown as a function of season. In the tropics, QBO easterly shear favors more intense deep convection, with effects being larger during boreal winter. The influence of the QBO on subtropical westerly jets and Rossby wave breaking in the UTLS is discussed. This historical overview is a contribution to the new SPARC initiative Stratospheric and Tropospheric Influences on Tropical Convective Systems (SATIO-TCS).

Key words: Quasibiennial oscillation, vertical coupling, tropical deep convection, subtropical UTLS