

The 2015-16 Disrupted Quasi-biennial Oscillation's Impact On Stratospheric Trace Gases

Paul A. NEWMAN^{#+}

NASA Goddard Space Flight Center, United States

[#]Corresponding author: paul.a.newman@nasa.gov ⁺Presenter

In this study we describe the evolution of the Quasi-Biennial Oscillation (QBO) during the Northern Hemisphere winter of 2015-16 using Singapore wind radiosonde observations, meteorological reanalyses, and satellite observations of trace gases from Aura MLS and SBUV. Normally, the QBO would show a steady downward propagation of the westerly phase. In 2015-16, there was an anomalous upward displacement of this westerly phase from ~30 hPa to 15 hPa. These westerlies impinge on, or “cut-off” the normal downward propagation of the easterly phase. In addition, easterly winds developed at 40 hPa. Comparisons to tropical wind statistics for the 1953-present record demonstrate that this anomalous 2015-16 QBO is unprecedented. This disruption of the equatorial wind affected not just the distribution of trace gases (like ozone, HCl and H₂O) in the tropics but in the mid-latitudes as well. The disruption led to a reduction of total ozone columns in the June-September period of the Northern and Southern hemisphere extratropics, along with perturbations to water and hydrochloric acid (HCl). In the NH, these total ozone values were among the lowest in the 40-year record.