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The confounding recent behaviour of the Quasi-Biennial Oscillation

Scott Osprey (1,2), Neal Butchart (3), Jeff Knight (3), Adam Scaife (3,4), Kevin Hamilton (5), James Anstey (6), Verena Schenzinger (1), and Chunxi Zhang (5)

(1) Department of Physics, University of Oxford, Oxford, United Kingdom, (2) National Centre for Atmospheric Science - Climate, United Kingdom, (3) Met Office Hadley Centre, Exeter, United Kingdom, (4) Department of Mathematics and Computer Science, University of Exeter, Exeter, United Kingdom, (5) International Pacific Research Center, University of Hawai'i, Honolulu, USA., (6) Canadian Centre for Climate Modelling and Analysis, University of Victoria, Victoria, Canada

High above the equator winds slowly change from blowing eastward to westward and back again roughly every 28 months in a natural climate rhythm known as the quasibiennial oscillation (QBO). These regular winds have been recorded since the 1950s and emerge from natural processes within the tropics e.g. clouds, convection, rainfall and the wave disturbances arising from these. The latter break down high up in the stratosphere, analogous to waves on a beach. Although a little tricky to capture in climate models, our understanding of the basic processes underpinning this climate rhythm was thought to be relatively complete. However, early in 2016 the stratospheric heart skipped a beat, confounding our present understanding of it.

The disruption was seen as a thin and rapidly growing westward wind jet at 25km within a deep background of eastward winds. The position of the thin jet could not be explained by waves percolating up through underlying winds from the turbulent lower atmosphere. Rather clues to the origin of the disruption pointed to agents outside the tropics - large scale waves usually found at mid-latitudes made their way to the tropics, causing the disruption.

Clear links are found between the winds occurring in the tropical stratosphere and the sorts of seasonal weather experienced in the tropics (e.g. MJO) and Northern/Southern Europe. Because these tropical stratosphere winds are predictable out to years, weather centres are keen to exploit them for seasonal forecasting. The 2016 disruption was not anticipated by weather centres and this has clear implications for the limiting skill of future seasonal forecasts.

The results from this study raise many questions. How will the disrupted QBO impact future seasonal forecasting? Will similar events recur more often in the future, and if so what role did anthropogenic climate change play in the 2016 event? Finally, what conditions ultimately resulted in the disruption?

Osprey, S. M. et al. An unexpected disruption of the atmospheric quasi-biennial oscillation. Science. 353, 1424–1427 (2016).