

How does the transition of the ozone-QBO signature from the tropics to the extra-tropics manifest itself in EMAC-ESCIMO, ERA interim and ozone CCI data?

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The quasi-biennial oscillation (QBO) in the tropical stratospheric zonal mean zonal winds is a major driver of interannual ozone variability. Here, we diagnose the QBO influence on interannual ozone variability in sub-tropical and mid-latitude regions. We confront model data (the CCM EMAC nudged and free running), reanalysis data (ERA-Interim) and level-3 satellite data (Ozone_CCI) with each other.

We extract the ozone-QBO signature from the data by using a Fourier filtering technique, so that the modelled and observed structures can be directly compared. Starting from the signal in total column ozone, we construct composite latitude-height cross-sections of ozone mixing ratios to reveal the vertical structure of QBO related changes for different phases of the ozone-QBO. We discuss the differences between the modelled (EMAC) and observed (CCI) signatures and compare them to ERA-Interim. A particular focus will be on the residual circulation and the induced ozone anomalies.

With this diagnostic we improve our understanding of the physical mechanisms that contribute to ozone variability and how an 'ozone change signal' can migrate from the tropics to the extra-tropics. Understanding the main mechanisms involved in this signal transfer lays the foundation for improved trend detection on decadal time scales.