



On the QBO modulation of the stratospheric tropical upwelling as evidenced by N₂O distributions

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In the lower stratosphere tropical probability density functions (PDFs) of N₂O have a distinct two peak structure evidencing the existence of a surf-zone around a region of upwelling. The separation of the two peaks is more pronounced in the winter season than in the summer season. The general morphology of N₂O PDFs has been used for model validation purposes in the past. Here, we will focus on the summer time variability of N₂O PDFs and how it is influenced by the phase of the quasi-biennial oscillation (QBO). We will construct observational evidence of the modulation stratifying MIPAS and MLS N₂O observations. Recent chemistry-climate model integrations will be treated in the same way and will be confronted with the observational results. A special focus will be on the new UK chemistry and aerosol community model (UKCA) and its ability to simulate an internal QBO which in its periodicity is highly dependent on the simulated chemistry and in turn impacts the tropical upwelling during summer time. This process oriented validation will help to support further model development to improve existing CCMs.