

4.119 Using chemical and idealised tracers to investigate interannual variability and trends in Asian monsoon transport.

Early Career Scientist

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Abstract:

The Asian summer monsoon acts as a transport pathway for anthropogenic surface pollution into the upper troposphere/lower stratosphere, and can have significant impacts on lower stratospheric composition. In this study, we investigate interannual variability and trends in Asian monsoon transport from 1960-2017 using an ensemble of UM-UKCA chemistry-climate model integrations. Modelled chemical species (CO, O₃ and H₂O) and dynamical quantities (PV, geopotential height) are used to explore the interannual variability in the strength of vertical transport; the extent to which vertical transport is confined within the core of the monsoon anticyclone; and to identify long-term changes in vertical transport associated with trends in the strength of the monsoon anticyclone. In addition, a number of idealised tracers have been implemented in the model to identify surface source regions of tropospheric airmass entrained in the monsoon circulation. These idealised tracers are emitted from selected surface regions, with two tracers with different prescribed lifetimes (5 and 30 days) emitted from each region. The use of these tracers allows us to separate airmasses which have undergone rapid and slow uplift, and to identify changes in contribution of different surface source regions to the composition of airmasses within the Asian monsoon anticyclone.