

The South Asian Summer Monsoon Anticyclone in Reanalysis

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Each year during boreal summer a distinct anticyclonic circulation is present in the Upper Troposphere Lower Stratosphere (UTLS) over South Asia. The so called South Asian Summer Monsoon (SASM) anticyclone is a large-scale circulation system, which is characterized by pronounced dynamic variability. Associated with the anticyclone enhanced abundances of tropospheric trace gases (i.e., CO, H₂O) are present in the UTLS over the SASM region. However, the contribution of the SASM anticyclone to stratospheric air masses is still under discussion mainly based on limited available observations and different meteorological reanalyses. Here in this study, we focus on evaluating different stratospheric reanalysis products and how they represent the SASM anticyclone and the transport through it to the stratosphere. We concentrate on current reanalyses that assimilate upper-air measurements and have a relatively high resolution such as ERA-Interim, JRA-55, MERRA, MERRA-2, and CFSR. Our evaluation will take into account the main climatological characteristics and the variability of the SASM anticyclone. We will also include comparison of cloud properties, diabatic heating rates and vertical velocities which are crucial for the transport through the SASM region into the stratosphere. Finally, Lagrangian calculations using diabatic heating rates reveal large deviations of transport pathways and transit times through the SASM UTLS. These SPARC Reanalyses Intercomparison Project (SRIP) results are relevant for better understanding transport and trace gas studies for the SASM UTLS region.

Key words: South Asian Summer Monsoon Anticyclone (SASM), SPARC Reanalysis Intercomparison Project (SRIP), Upper Troposphere Lower Stratosphere (UTLS), transport