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Representation of the summer Monsoon circulation of the lower stratosphere in chemistry-climate models

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The summer monsoon circulation of Asia and North America can be recognised in the lower stratosphere as pronounced anticyclones (Dunkerton, 1995). Averages of meridional velocities for a segment on the eastern/western side of each anticyclone show northward/southward flow reaching from the upper troposphere to the lower stratosphere. Connected with the convergent/divergent meridional flow, descent/ascent in the respective segments can be observed. The monsoon circulation results in low ozone concentrations and high water vapour concentrations at the 100 hPa level in the stratosphere (Gettelman, 2004), indicating enhanced troposphere to stratosphere exchange.

The results of the middle atmosphere Chemistry-Climate Models CCMs are compared to ERA40 and NCEP/NCAR reanalyses and to HALOE satellite data. This analysis of transient model runs for the period 1980 - 1999 shows that CCMs are able to reproduce the main features of the summer monsoon circulation in the upper troposphere and lower stratosphere.