The direct effect of the 11-year solar cycle in the upper stratosphere depends on a good representation of solar radiation processes in the radiative transfer and the photochemical parameterizations, and is reasonably simulated by the CCMs as discussed in the recent SPARC-CCMVal report. However, uncertainties exist for indirect dynamical effects in the tropical lower stratosphere.

In order to investigate whether the observed maximum in the solar temperature and ozone response in the tropical lower stratosphere is related to non-linear interactions, to contaminations by other signals such as the QBO or ENSO or to both, coordinated CCM simulations with the ECHAM5/MeSSY (EMAC-FUB), NCAR’s Whole Atmosphere Community Climate model (WACCM) and the MRI models have been performed. These CCM simulations are similar to the REF-B1 CCMVal simulations from 1960 to 2005 but use prescribed filtered QBO and filtered SST and sea ice forcings. The SSTs and the sea ice time series have been filtered to remove QBO and solar cycle signals, while the observed equatorial mean zonal mean wind data have been filtered to retain QBO signals only and exclude ENSO and solar cycle signals explicitly. WACCM3 and EMAC-FUB nudge a QBO, whereas the MRI model produces a self-consistent QBO.

We will analyze and compare the solar signal in the filtered and the unfiltered runs in order to shed light on aliasing effects between solar cycle, QBO and ENSO. Additionally, the impact of the uncertainty in the prescribed solar irradiance forcing will be discussed.