The evolution of stratospheric ozone in a changing climate is investigated by analysing simulations with the Chemistry-Climate-Model (CCM) EMAC-FUB. In order to investigate the impact of different parameters such as increasing greenhouse gas (GHG) concentrations, the regulation of ozone depleting substances (ODSs) and the changing sea-surface temperatures (SSTs) on the evolution of stratospheric ozone, sensitivity studies have been performed for the past (1860), the present (2000) and the future (2045). Additionally, transient simulations integrated from 1960 to 2100 according the CCMVal SCN-B2c and SCN-B2d recommendations are used for comparison.

Changes in the atmospheric composition and in stratospheric temperature will affect ozone chemistry as well as changing dynamics will affect ozone transport. Different model studies indicate an acceleration of the stratospheric meridional circulation in the 21st century. Consequently, the large scale transport of trace gases, especially ozone, from the tropics into the extra-tropical latitudes is expected to be modified. In our study, the effect of an altered chemistry on the future long-term changes in stratospheric ozone is analysed by splitting the contributions of the changes due to GHG induced cooling and due to the decrease of the ODSs abundances in the stratosphere. Ozone changes due to transport are investigated in more detail by analysing the results of a newly implemented diagnostic tool that allows the identification of the ozone origin at any point in the atmosphere and hence the distinction of locally produced ozone and ozone that has been transported, e.g. from the tropics.