



Comparisons of ground-based total column CO₂ measurements and global transport model simulations

Sabrina Niebling, Ina Burjack, and Dietrich Feist

Max Planck Institute for Biogeochemistry, Jena, Germany (sniebl@bgc-jena.mpg.de)

Anthropogenic emissions of greenhouse gases like CO₂ and CH₄ are important drivers of changes in radiative forcing and therefore climate changes. However, there remain still large uncertainties concerning the estimates of source and sink distributions of these gases to and from the atmosphere and more measurements are needed to adequately assess the problem.

In 2004, the Total Carbon Column Observing Network (TCCON) was formed. It consists of ground-based Fourier Transform Spectrometer (FTS) systems all around the world that provide high-resolution near-infrared spectral data. From these spectra, it is possible to retrieve total columns of CO₂, CH₄, CO and several other trace gases with very high precision. Currently, TCCON has 20 operational stations.

Here, we present comparisons of timeseries of CO₂ measured at different TCCON stations with modeled data gained by using the global transport model TM3. The analysis includes statistical parameters like biases, variability and correlation coefficients for both timeseries and their difference over the course of one year.

In addition, we show footprints of the different TCCON stations to interpret the results. The footprint is defined as the typical area where air parcels that are observed by the station originate. The calculations were done by adapting the adjoint of the TM3 model to calculate total columns.