Improved tropospheric NO_2 columns retrieved from TROPOMI on board the Sentinel-5P satellite

NO_2 is a short-lived, highly reactive trace gas in the troposphere which is mainly co-emitted with CO_2 during combustion processes. Therefore, NO_2 can be used as a proxy to estimate CO_2 emissions from large point sources such as coal fired power plants. Evaluating the potential of space-borne NO2 observations for CO2 emission estimates is one of the aims of the German ITMS (Integrated Tropospheric Monitoring System) project. To determine the vertical column density (VCD) of NO_2 the air mass factor (AMF) need to be well known. It can be calculated using a priori information of the observation geometry and the state of the atmosphere. While the a priori data used in the operational TROPOMI retrieval is appropriate for global applications, it does not have sufficient spatial resolution for local retrievals for example over power plants.
In this work, spatially and temporally highly resolved AMF for the NO_2 retrieval window of the tropospheric monitoring instrument (TROPOMI) were calculated over Europe, using the bi-directional reflectance distribution function (BRDF) kernel coefficients obtained from the moderate imaging spectrometer (MODIS). The resulting AMFs are compared to AMFs obtained using the directional-dependent Lambertian equivalent reflectivity (DLER), which is used in the operational TROPOMI product.