



The MAInz Profile Algorithm (MAPA) v1.x

Steffen Beirle, Julia Remmers, Steffen Dörner, and Thomas Wagner
MPI Chemie Mainz, Satellite remote sensing, Mainz, Germany (steffen.beirle@mpic.de)

The MAInz Profile Algorithm (MAPA) derives vertical profiles of aerosol extinction and trace gas concentration from MAX-DOAS measurements. Within MAPA, vertical profiles are parameterized by (1) the integrated column, i.e. AOD (aerosols) or VCD (trace gases), (2) the layer height, and (3) a parameter determining the profile shape. As forward model, a look-up-table is used (calculated with the radiative transfer model McArtim) relating these parameters to corresponding DSCDs for different observation geometries.

In previous versions, best matching parameters have been determined by a least-squares minimization (Levenberg-Marquardt). Here we present a different approach based on a Monte Carlo method: Ensembles of best matching parameter sets are derived by covering the parameter space with random numbers and keeping those yielding the best agreement (i.e. lowest RMS) between forward model and measurement. Thus, not only one, but a set of profiles is derived. This directly allows to calculate the mean and standard deviation (i.e. uncertainty) of the vertical extinction/concentration profile.

MAPA is implemented as stand-alone Python script, thus can be operated on any PC or laptop without licence restrictions. The profile retrieval for one elevation sequence takes about 2 seconds.