



A sensitivity study of LIRIC algorithm to user-defined input parameters, using selected cases from Thessaloniki measurements

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A targeted sensitivity study of the LIRIC algorithm was considered necessary to ascertain the uncertainty introduced to the volume concentration profiles, due to the arbitrary selection of user-defined input parameters. For this purpose three different sensitivity tests were performed using Thessaloniki's Lidar data. Overall, tests on the selection of the regularization parameters, the upper and a lower limit were performed. The different tests applied on two cases with different aerosol types, a dust episode and a typical urban case. The regularization parameters consist of 3 different sets of parameters referring to Lidar, sunphotometer and smoothness restrains. Smoothness parameters were remained unchanged, while the others varied to several orders of magnitude. All the possible combinations between these orders of magnitude were performed, so as to evaluate the uncertainties introduced to the results, from their choice. Only retrievals that did not differ more than 5% of the AERONET's AOD were considered in the uncertainty estimates. The upper limit test was performed by cutting the signal at three different heights above the reference height while in the lower limit test a step of ± 200 m was applied above-below the height where full overlap is observed. The choice of user-selected regularization parameters can introduce an uncertainty of 10-25%, depending on the case, while the choice of the upper limit only 1%. The choice of the lower limit introduces a larger uncertainty that can reach up to 30% around the overlap region. These uncertainties refer to the concentration profiles only (fine-coarse).