



Aerosols under, over, in, and near clouds: a comprehensive sensitivity study of the UV Aerosol Index from SCIAMACHY

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The UV Aerosol Index (UVAI) is a semi-quantitative measure of aerosols. It is mainly determined by the optical thickness, absorption properties, and altitude of the aerosol layer. The UVAI is most sensitive to UV-absorbing aerosols –which produce positive UVAI values– but significant negative UVAI values can be found in the presence of non-absorbing (“scattering”) aerosols or clouds.

An important advantage of UVAI is that it can be determined in the presence of clouds; however, the effects of clouds on UVAI cannot be neglected. Clouds influence the UVAI in three main ways: (1) by shielding aerosols from view, (2) by enhancing albedo below an aerosol layer, and (3) by contributing an own, generally negative, “cloud UVAI” on the order of 1-2 UVAI units. For quantitative applications of UVAI (e.g., estimation of aerosol layer height or determination of single-scattering albedo) these effects need to be taken into account.

We here present the results from extensive modeling studies of the different effects of clouds on UVAI in presence and absence of different types of aerosols, and corroborate them with measurements from the SCIAMACHY instrument.