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Upgrade and assessment of the on-site calibration methods used in SKYNET

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The improved Langley method (ILP) is an in-situ calibration method developed for Prede POM Sun/sky radiometers. The so-obtained calibration is used to retrieve the aerosol optical depth (AOD) in SKYNET from direct irradiance data, and other optical properties. As opposed to the standard Langley method where we need a pristine high-altitude site to calculate calibration value, ILP is used at any site with varying aerosol optical depth. In the ILP, the Skyrad pack 4.2 version has been used for years to invert the radiance data, followed by strict screening criteria to derive the calibration. In the process of performing ILP, radiance data between the scattering angle of 3^{o}-30^{o} is selected. From the previous studies, it is well established that the ILP has weak dependence on imaginary refractive index and Single Scattering Albedo (SSA) in this range, whereas ILP has major dependence on real refractive index. Apart from this, it is also assumed that the refractive index remains almost constant during the period of observation.However, this assumption is not always respected in real conditions. With the change of seasons, the observation sites can face different weather and atmospheric situations. For sites like Valencia (Spain), which is affected by urban pollution but also dust intrusions during summer, the type of dominant aerosol can change during the observation time. In the present study, we aim to check the dependencies of ILP method, by using multiyear data of POM01 and POM02 instruments located at Valencia. The idea behind this is to use different assumptions of real, imaginary refractive index instead of fixed values. In previous analysis of this kind, assumed values were changed keeping the other inputs constant. However, we plan to do this sensitivity analysis by using different combinations of the input values. Other strategies will be also explored in order to estimate more accurate calibrations, as calibration transfers from pre and post calibrated Cimel instruments, belonging to AERONET, to be used as reference. Improving the accuracy in calibration value will help us in reducing the uncertainity associated with the calculation of aerosol properties in the SKYNET network.

Keywords: Improved Langley Plot, Calibration, SKYNET

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