

An improved cloud screening algorithm for skyradiometer measurement analysis and application to Asian dust detection

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Abstract

Cloud screening algorithm including variability test and coarse mode test was developed for removing cloud-affected data in the skyradiometer measurements. The results compared to cloud amount from weather station reports and lidar measurements show that the variability test appears to effectively remove thick and low-level clouds. On the other hand, the use of size distribution appears to effectively remove thin and high-level clouds. The new algorithm based only on using skyradiometer measurements demonstrated that cloud screening can be improved in comparison to the SKYNET data processing algorithm.

The developed cloud screening method is then applied for the dust detection from skyradiometer measurements. Validating results with SYNOP dust reports and the yellow sand index from lidar measurements, it was shown that the developed cloud screening methods helps to detect dust cases, effectively removing cloud-contaminated signals from the dust signals that determined from current SKYNET algorithm. In turn this algorithm contributes to improved accuracy of the dust influence on radiative forcing and its efficiency by reducing uncertainties in the AOT and SSA retrievals.