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Identification of cloud contamination in sun photometric data using ground-based sky imagery

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Determination of atmospheric aerosol properties is a key step in many meteorological and energy fields. This is the case for solar concentrating systems, where atmospheric turbidity is the main attenuating factor under cloudless sky conditions. Remote sensing and ground-based observations have experienced large advances in the retrieval of several aerosol parameters in recent years. Different methods have been developed for automatic detection of cloudless conditions. Unfortunately, these automatic cloud screening algorithms are not totally reliable, and could lead to biased results. In this study, we analyze the efficiency of the cloud screening method used in the Aerosol Robotic Network (AERONET) to provide their Level 1.5 data from raw Level 1.0 data from the radiometric site located in Huelva (Spain). The presence of clouds is detected from visual inspection of digital images obtained by an all-sky camera, which is located/co-located with the AERONET sunphotometer. A total of 240 days with concurrent data for both the sun photometer and the all-sky camera were available for the year 2015. Results show that about 10% of Level 1.5 sun photometric data are contaminated with clouds. On the other hand, we also found cloud-free sky cases where raw Level 1.0 data were removed from Level 1.5. The effect of misclassification on the average daily aerosol optical depth is also presented.

Biography

Gabriel López studied Theoretical Physics at the Universidad de Granada (Spain). He completed his PhD from the Universidad de Almería (Spain). He is currently an Associate Professor at the Escuela Técnica Superior de Ingeniería of the Universidad de Huelva (Spain). He has co-authored more than 20 articles in reputed journals. The main research topic is the solar resource modeling and forecasting using artificial intelligence techniques and remote sensing. At present, he leads one of the three research teams of the Spanish national project PRESOL.

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