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Cloudiness estimation from satellite and ground observations

Joaquín Alonso (1,2), Samuel Quesada-Ruiz (4), Mercedes Martínez-Durbán (3), Joaquín Tovar-Pescador (4), Francisco J. Batlles (1,2), and David Pozo-Vázquez (4)

(1) Department of Chemistry and Physics, University of Almería, 04120, Almería, Spain., (2) Ciesol, Join Centre University of Almería-CIEMAT, 04120, Almería, Spain., (3) Department of Computing, University of Almería, 04120, Almería, Spain., (4) Department of Physics, University of Jaén, 23071, Jaén, Spain.

As part of the development and expansion of CSP (concentrated solar power) technology, one of the most important operational requirements is to have complete control of all factors which may affect the quantity and quality of the solar power produced. The importance of clouds in the solar radiation attenuation is a transcendental and decisive factor in the incident energy from the sun. To have an absolute knowledge of sky features is useful information to CSP plant operators, who can adapt the production system to the sky conditions. Considering the importance of the presence of clouds in the management of CSP plants, in this work we present a cloudiness estimation using two different technologies. Firstly, clouds are identified applying remote sensing techniques to Meteosat satellite images, where the clouds are identified, using multispectral tests, and classified into three groups: low, medium and high, depending on the cloud top height. The second technology involved in the cloudiness estimation is a hemispheric sky camera. In this estimation, radiometric data are used to classify the sky as cloudless, partially-cloudy and overcast, making a sky camera image processing according to the classification, providing cloud estimation from a ground vision. The average success probability in the cloud estimation is of about 85% for satellite estimation and 94% for sky camera estimation.