

## **The solar radiation evaluation by satellite images processing**

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**Abstract.** To evaluate the global solar irradiation flux received at the ground surface for Algeria, an analytical model is implemented by processing satellite images and solving the equation of radiative transfer. This model is derived from that initially worked by C. Gautier *et al.* in 1980 by using high-resolution Goes images. We get that it is well adapted to the processing of lesser resolution images such as those collected by Meteosat 2 following the B2 format. The data base under study mainly consists of clear-sky B2 Meteosat images recorded every three hours in the visible channel (i.e., [0.4 – 1.1  $\mu\text{m}$ ]) during the 1986/87 period and representing North Africa and Southern Europe. The methodology used is based on the computation of the radiative transfer of solar energy from the Sun to the Earth through the atmospheric layers and taking into account the Rayleigh diffusion and absorption by the water molecules in the atmosphere. The energy exchanges are therefore evaluated considering the optical path due to the reflection of solar rays by the upper atmosphere towards the satellite and that followed by the solar rays which travel the atmosphere towards the earth, are reflected by the ground surface and return towards the satellite through the atmosphere. Hourly and daily global solar irradiation fluxes received at the ground on a horizontal surface have therefore been evaluated by applying the analytical model to the Meteosat images. The obtained results were compared to the hourly ground solar measurements recorded in the radiometric stations of Bouzareah (Algiers) and Oran during the 1986/87 period. Since the deviations between both types of solar data do not exceed 10%, the radiances estimated by modelling are found to be close to the related ground measurements.