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THE HELIOCLIM PROJECT: FROM SATELLITE IMAGES TO SOLAR RADIATION MAPS

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The HelioClim project aims at mapping the solar radiation and its components over Europe, Africa, and Atlantic Ocean from 1985 up to now, and subsequently at making these maps available for the different users. To develop such a climatological database of solar radiation, images of the visible channel of the series of Meteosat satellites are used. Once properly processed, such satellite images can produce maps of solar radiation which are more accurate than those obtained from interpolation of measurements of radiation made at ground level (Zelenka, 1986).

For the processing, the world-wide used Heliosat method has been selected, in part because it is one of the most accurate available method, in part because of its inherent robustness (Cano *et al.*, 1986. Diabaté *et al.*, 1988, 1989; Beyer *et al.*, 1996). It makes use of a cloud index, which is derived from values of apparent albedo extracted from the satellite images. This cloud index characterises the transmittance of the atmosphere and is then related to an atmospheric clear-sky index. The clear-sky index is equal to the ratio of the observed irradiation to the irradiation one would observe under clear-sky. Finally, the global solar radiation is deduced from this clear-sky index over each pixel of the original satellite images.

The Heliosat method has some weak points for such a project, which includes routine processing of a very large number of images. Therefore, the first step of the HelioClim project is the improvement of the Heliosat method regarding accuracy, and more generally quality. Thus, four modifications have been investigated in order to design a better version of Heliosat: the Heliosat-2 method They concern the calibration function, the clear-sky model, the evaluation of the albedo of the brightest clouds, and the relationship between the clear-sky index and the cloud index. To validate these improvements and the Heliosat-2 method, the values of hourly global solar radiation estimated from high resolution satellite images will be compared with ground measurements.

Once the new version accepted, its behaviour will be tested when passing from high to reduced resolution data. HelioClim cannot afford the use of high resolution data because of the very high costs involved in acquiring the data. Therefore the reduced resolution B2 format will be used. Then, the new version of the Heliosat method will be applied to a large database of B2 Meteosat images to obtain the climatological database of solar radiation. Finally, this database of solar radiation will be available on the WWW for the different users : http://www-helioserve.cma.fr/.

The presentation will address the present status of the HelioClim Project. After a short description of the Project, the improvements already brought to the Heliosat method will be discussed: calibration, clear-sky model, relationship between clear-sky index and the cloud index. Their influence upon the quality of the assessment of the solar radiation will be shown. The conclusion will include a presentation of the further steps of HelioClim.

Keywords: radiation, climatology, atlas, measurements, satellite

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