

TITLE OF THE INVENTION

SYSTEM FOR MEASURING COMPONENTS OF SOLAR RADIATION

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ABSTRACT

The invention relates to a system for measuring solar radiation. The system comprises a camera (10) equipped with a hemispherical objective (20) and comprising a sensor (12) able to sense light in order to generate an image, and a processor (30) able to: perform a geometric calibration of the camera (10) in order to obtain the correspondence between the coordinate system of the pixels (125) of the image and the coordinate system of the camera (10); calculate the solid angle occupied by each pixel (125) of the image; perform a second calibration of the camera (10) by comparing the theoretical position of the sun and its position in the image, so as to obtain the correspondence between the coordinate system of said camera (10) and the cardinal points; calculate the angle between each pixel (125) and the zenith (PZA), the angle between each pixel (125) and the azimuth (PAA), the angle between the sun and the zenith (SZA), and the angle between the sun and the azimuth (SAA), then the angle between each pixel (125) and the sun (SPA); obtain a high-dynamic-range image (HDR) of the sky; calculate the global horizontal irradiance (σ_{GHI}), the direct normal irradiance (σ_{DNI}), and the diffuse horizontal irradiance (σ_{DHI}), which are defined as the sum of the luminances measured by the pixels (125) of the image belonging to a first region of interest (Λ_1), to a second region of interest (Λ_2), and to a third region of interest (Λ_3), respectively, the sums being weighted by the solid angle of the region of interest in question; and convert (σ_{GHI}), (σ_{DNI}), and (σ_{DHI}), into global horizontal luminance (GHI), direct normal irradiance (DNI) and diffuse horizontal irradiance (DHI), respectively.

Figure 1

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