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Surface UV radiation in the South of Portugal: monitoring and assessment of cloud effects

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UV radiation reaching the surface has particular significance within the solar spectrum due to its potential harmful effects, constituting a hazard for several life forms on Earth, including human life. UV radiation monitoring is especially important for a region amongst those with the highest insolation values in Europe, as the region of Alentejo (south of Portugal). On the other hand, clouds are the major regulators of the Earth radiation budget and play a central role in modulating UV radiation. It is thus of extreme importance not only to monitor UV radiation but also to understand the relationship between UV radiation variations and cloud type and cover.
In the present work, long term measurements of both UV B (280 – 315 nm) and UV AB (280 – 400 nm) irradiances taken during about seven years, are presented and analyzed. The UV irradiance data were measured with MACAM radiometers, which are installed in the Atmospheric Physics Observatory of the University of Évora Geophysics Center - CGE (38°34'N, 7°54'W, 300 m above mean sea level) since 2005. Special attention is devoted to calibration issues, since the radiometers were calibrated at "El Arenosillo" ESAt/INTA laboratory in 2009 and a methodology based on radiative transfer calculations combined with observations from atmospheric quantities, was developed and applied to retro-calibrate the data from 2009 to 2005.
Cloud optical thickness and cloud cover obtained from ground-based instrumentation installed in the CGE observatory, as well as from MODIS, onboard Terra and Aqua satellites, are used in order to investigate fluctuations of UV irradiance due to variation in these cloud quantities. UV irradiance changes due to ozone and aerosols are also taken into account, in order to separately quantify the cloud effects.

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