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UV and Global solar irradiance measurements and analysis during the Marsaxlokk (Malta) campaign

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The Universities of Malta and Valladolid (Spain)developed a solar radiation measurement campaign, which took place at the Institute for Sustainable Energy in the south-eastern village of Marsaxlokk (35.84ºN; 13.54ºE), Malta, between May and October 2012.
A wide variety of instruments were involved in the campaign, providing a complete data series of radiative and atmospheric compounds. These included data of erythemal solar radiation and UV index (from UVB-1 pyranometer), total shortwave radiation (global and diffuse components from CM-6B and CM21 pyranometers respectively). Total ozone column (TOC), aerosol optical depth and precipitable water column data retrieved from satellite sensors and Microtops-II sunphotometer were available on site.
Comparison of atmospheric compounds from ground measurements and satellites show that TOC from Ozone Monitoring Instrument (OMI), TOMS and DOAS algorithms are well correlated with ground-based data recorded. Parametric models for evaluating solar UV, global and diffuse irradiance have been proposed from which cloud effects on solar irradiance and Cloud Modification Factors (CMF) are evaluated. The UV index, defined as the sun exposure that can produce sunburn on human skin was also calculated. During the campaign different atmospheric conditions were observed, particularly events with high aerosol desert dust. A variety of aerosol types from different sources (desert dust, biomass burning, continental and maritime) reach Malta. In this campaign several dust events trajectories have been identified by means of the HYbrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model and by synoptic conditions. Hence, changes in the UV index due to atmospheric aerosols were characterized.