



## **Oscar: a portable prototype system for the study of climate variability**

Fabio Madonna, Marco Rosoldi, and Francesco Amato  
(fabio.madonna@imaa.cnr.it)

The study of the techniques for the exploitation of solar energy implies the knowledge of nature, ecosystem, biological factors and local climate. Clouds, fog, water vapor, and the presence of large concentrations of dust can significantly affect the way to exploit the solar energy. Therefore, a quantitative characterization of the impact of climate variability at the regional scale is needed to increase the efficiency and sustainability of the energy system. OSCAR (Observation System for Climate Application at Regional scale) project, funded in the frame of the PO FESR 2007-2013, aims at the design of a portable prototype system for the study of correlations among the trends of several Essential Climate Variables (ECVs) and the change in the amount of solar irradiance at the ground level. The final goal of this project is to provide a user-friendly low cost solution for the quantification of the impact of regional climate variability on the efficiency of solar cell and concentrators to improve the exploitation of natural sources.

The prototype has been designed on the basis of historical measurements performed at CNR-IMAA Atmospheric Observatory (CIAO). Measurements from satellite and data from models have been also considered as ancillary to the study, above all, to fill in the gaps of existing datasets.

In this work, the results outcome from the project activities will be presented. The results include: the design and implementation of the prototype system; the development of a methodology for the estimation of the impact of climate variability, mainly due to aerosol, cloud and water vapor, on the solar irradiance using the integration of the observations potentially provided by prototype; the study of correlation between the surface radiation, precipitation and aerosols transport.

In particular, a statistical study will be presented to assess the impact of the atmosphere on the solar irradiance at the ground, quantifying the contribution due to aerosol and clouds and separating their effect on the direct and the diffuse components of the solar radiation.

This also aims to provide recommendations to the manufacturer of the devices used to exploit solar radiation.