



## Fog impact on the solar photovoltaic power production

Saverio Teodosio Nilo (1), Angela Cersosimo (1), Domenico Cimini (1), Francesco Di Paola (1), Edoardo Geraldi (2), Elisabetta Ricciardelli (1), Filomena Romano (1), and Mariassunta Viggiano (1)

(1) Institute of methodologies for environmental analysis, National Research Council, Tito Scalo, Italy (correspondence to: saverio.nilo@imaa.cnr.it), (2) Institute of archeological heritage - monuments and sites, National Research Council, Tito Scalo, Italy

Solar photovoltaic (PV) power production is strictly dependent on the global irradiance that reaches PV panels plane. It follows that solar power production can change on different meteorological conditions. Under cloudy and rainy weather conditions, PV power production drops 40 – 90 % depending on how dark and heavy the rain and clouds are. Under fog solar panels still work, but the amount of power generated depends on the fog thickness; if the cloud cover is at its worst, panels might produce only 5 – 10 % of the energy they normally do, but a thin layer of fog has far less impact on solar energy output. The main object of this work is to increase the knowledge of fog impact on solar production. This can improve solar PV power output forecast and reduce the uncertainty of this kind of renewable source and its related costs for the grid operators. Fog detection (physical and statistical tests) has been implemented by using satellite data. Research in satellite meteorology has shown that satellite imagery can be useful in detecting fog in large areas where there are no observation platforms. The relations between fog characteristics (optical and microphysical properties and top and base height) and ground global irradiance and between fog characteristics and PV power production losses have been derived. Results are validated with PV test plant power production measured data.