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High resolution solar atlas for Greece under climate change

Iason Markantonis, Nadia Politi, Diamando Vlachogiannis, Nikolaos Gounaris, Karozis Stylianos, and Sfetsos Athanasios

NCSR 'Demokritos', INRASTES, Agia Paraskevi, Greece (jasonm@ipta.demokritos.gr)

Renewable energy (RE) is considered as the most attractive and climate friendly source of energy to mitigate GHG effects. Due to the inherent, “non stationary” nature of climate, it is of paramount importance to be able make risk-informed decisions considering also the future conditions when installing / operating RES in Greece. As the amount of solar energy falling on the earth’s surface is highly influenced by local and large scale atmospheric movement conditions, high resolution simulations should be used to calculate it.

The aim of this research is to generate a climatology atlas of mean yearly and seasonal values for the GHI for the “historic time period” 1980-2009 and compare it against future values in 2020-2050. The current study employs high resolution downscaled climate model data to generate future solar radiation atlases for Greece based on RCP4.5 and RCP8.5 scenarios. Greece is a country with high potential in renewable solar energy. Several studies have mentioned the high amount of sunshine hours in most parts of the country, (e.g. Matzarakis & Katsoulis, 2006¹, HNMS²).

The data for both historic and future period analyses are produced from WRF 5km downscaled model output with temporal resolution of 6 hours, using as input ERA-INTERIM and EC-EARTH input data, respectively. The study that has produced the atmospheric model dataset is described in Politi, et al. (2018)³. We explore spatio-temporal changes of the GHI climatology and identify those areas which will exhibit considerable changes in the future.

References:

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