Geophysical Research Abstracts
Vol. 18, EGU2016-6619-4, 2016
EGU General Assembly 2016

Surface solar radiation patterns over the climatically sensitive region of Eastern Mediterranean

Georgia Alexandri (1,2), Aristeidis K. Georgoulias (2), Charikleia Meleti (1), Dimitris Balis (1), Konstantinos Kourtidis (2), Arturo Sanchez-Lorenzo (3), Jörg Trentmann (4), and Prodromos Zanis (5)

(1) Laboratory of Atmospheric Physics, School of Physics, Aristotle University of Thessaloniki,Thessaloniki, Greece (alexang@auth.gr), (2) Laboratory of Atmospheric Pollution and Pollution Control Engineering of Atmospheric Pollutants, Department of Environmental Engineering, Democritus University of Thrace, Xanthi Greece, (3) Instituto Pirenaico de Ecología, Consejo Superior de Investigaciones Científicas (IPE-CSIC), Zaragoza, Spain, (4) German Meteorological Service, Offenbach, Germany, (5) Department of Meteorology and Climatology, School of Geology, Aristotle University of Thessaloniki, Thessaloniki, Greece

In this work, the spatiotemporal variability of surface solar radiation (SSR) is examined over the region of Eastern Mediterranean for the 31-year period 1983-2013. For the scopes of this research, high resolution (0.05 x 0.05 degrees) satellite data from the CM SAF SARAH (Satellite Application Facility on Climate Monitoring Solar surfAce RAdiation Heliosat) product were used. The CM SAF SARAH dataset was validated against quality-assured observations from five ground stations located in the region showing that the satellite data are in good agreement with the ground-based data. Also, the dataset was found to be homogeneous and hence appropriate for climatological studies. The high spatial resolution of the product allows for studying various local features which are mostly connected to the topography. The comparison of the CM SAF SARAH product against three satellite-based (CERES, GEWEX, ISCCP) and one reanalysis (ERA-Interim) products showed that the satellite-based datasets underestimate SSR while the reanalysis dataset overestimates SSR. A novel method that incorporates radiative transfer simulations was applied on satellite data from CM SAF and CERES and a set of other data in order to figure out which are the parameters that drive the observed SSR differences between the two products. According to the CM SAF SARAH dataset, the SSR trend is positive and statistically significant at the 95 % confidence level (0.2 W/m2/year or 0.1 %/year) over Eastern Mediterranean for the period 1983-2013. Compared to the other satellite-based and reanalysis products, the CM SAF SARAH SSR trends are closer to the ground-based ones possibly due to the high spatial resolution and the better representation of cloud radiative effects in the dataset. It is suggested here that the inclusion of the interannual variability of aerosol load and composition within CM SAF SARAH would allow for a more accurate reproduction of the SSR trends over regions with high aerosol variability.