Atmospheric Chemistry and Physics
An Interactive Open Access Journal of the European Geosciences Union

Atmos. Chem. Phys., 7, 6047-6059, 2007
www.atmos-chem-phys.net/7/6047/2007/

Performance of the meteorological radiation model during the solar eclipse of 29 March 2006

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Abstract. Various solar broadband models have been developed in the last half of the 20th century. The driving demand has been the estimation of available solar energy at different locations on earth for various applications. The motivation for such developments, though, has been the ample lack of solar radiation measurements at global scale. Therefore, the main goal of such codes is to generate artificial solar radiation series or calculate the availability of solar energy at a place.

One of the broadband models to be developed in the late 80's was the Meteorological Radiation Model (MRM). The main advantage of MRM over other similar models was its simplicity in acquiring and using the necessary input data, i.e. air temperature, relative humidity, barometric pressure and sunshine duration from any of the many meteorological stations.

The present study describes briefly the various steps (versions) of MRM and in greater detail the latest version 5. To show the flexibility and great performance of the MRM, a harsh test of the code under the (almost total) solar eclipse conditions of 29 March 2006 over Athens was performed and comparison of its results with real measurements was made. From this hard comparison it is shown that the MRM can simulate solar radiation during a solar eclipse event as effectively as on a typical day. Because of the main interest in solar energy applications about the total radiation component, MRM focuses on that. For this component, the RMSE and MBE statistical estimators during this study were found to be 7.64% and −1.67% on 29 March as compared to the respective 5.30% and +2.04% for 28 March. This efficiency of MRM even during an eclipse makes the model promising for easy handling of typical situations with even better results.

Final Revised Paper (PDF, 1032 KB) Discussion Paper (ACPD)

Citation: Psiloglou, B. E. and Kambezidis, H. D.: Performance of the meteorological radiation model during the solar eclipse of 29 March 2006, Atmos. Chem. Phys., 7, 6047-6059, 2007. Bibtex EndNote Reference Manager