



## Assessing the surface solar irradiance under cloud-free skies in Israel with the McClear model

Mireille Lefevre and Lucien Wald

MINES ParisTech - PSL Research University - Center for Observation, Impacts, Energy - CS 10207 - 06904 Sophia Antipolis Cedex, France (lucien.wald@mines-paristech.fr)

A new fast clear-sky model called McClear was developed within the MACC project (Monitoring Atmosphere Composition and Climate) to estimate the downwelling shortwave direct and global irradiances received at ground level under clear skies and is now available as a Web service. It is a fully physical modelling that exploits the recent results on aerosol properties, and total column content in water vapor and ozone produced by the MACC project. It has been validated for several places in the world. The work presented here focus on Israel and aims at checking the performances of McClear under this desert conditions. McClear irradiances are compared to 1 min measurements made in clear-sky conditions at three stations which are distant from less than 100 km. The bias for global irradiance is comprised between 2 and 32 W m<sup>-2</sup>, i.e. between 0% and 4% of of the mean observed irradiance. The RMSE ranges from 30 W m<sup>-2</sup> to 41 W m<sup>-2</sup> (4%). The correlation coefficient is 0.99. The bias for the direct irradiance at normal incidence (DNI) is comprised between -68 and +13 W m<sup>-2</sup>, i.e. between -8% and 2% of of the mean observed DNI. The RMSE ranges from 53 W m<sup>-2</sup> (7%) to 83 W m<sup>-2</sup> (10%). The correlation coefficient ranges between 0.963 and 0.967. Overall, the errors are very small and it can be concluded that McClear predicts accurately the solar radiation in clear-sky conditions. The performances are similar for the three sites for the global irradiance and for the DNI to a lesser extent. This was expected and demonstrates the robustness of the McClear model combined with MACC products. These results are discussed in the light of those obtained by McClear for other desert areas : Egypt and United Arab Emirates.