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A13B-02 ***Poster***

NUMERICAL MODELLING OF THE INFLUENCE OF CLOUDINESS AND RELATIVE HUMIDITY ON SURFACE SOLAR IRRADIATION

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Wind and solar renewable energy are increasingly necessary in order to replace fossil fuels increasing energy security and avoiding GHG emissions. Currently in Brazil, SONDA Project is intended to generate a meteorological and solarimetric database that meets the demand for scientific information on solar and wind resources. The paper aims an analysis of the influence of cloud cover and relative humidity on solar irradiance, measured at the Southern Space Observatory - SSO/CRS/CCR/ INPE - MCT. The parameters studied are the Kt index as the ratio between global solar irradiance at the surface and at the top of the atmosphere, cloud cover, and relative humidity. It was used a Pyranometer CM21 to acquire global solar irradiance data, a Total Sky Imager TSI-440 to get the fraction of cloudiness and a RM Yong Co. sensor, Model-41372, to provide the relative humidity data. All sensors are operating at the SONDA site located at the Southern Space Observatory. Empirical models were developed by using data acquired from September 2005 till December 2006. The polynomial regression relating Kt with the total and opaque fractions of cloud cover were obtained. Additionally, a multiple linear regression (MLR) model, using the fine and opaque cloud fraction, and a multiple polynomial regression (MPR) model, using the total fraction of clouds along with the relative humidity, were used to make Kt estimations. It was calculate the statistical deviations MBE and RMSE between the estimated models and ground data acquired in

2007. The MBE values founded was 7.8% for the RLM model, 7.5% in the polynomial model for the fraction of opaque clouds, 6.2% for the total cloud fraction 2% on the MPR model. RMSE values were 31% for the MLR model, and 32% and 29% for the polynomial models of total and opaque fractions of cloud cover, respectively, and 11% on the MPR. A statistical analysis of the MBE and RMSE deviations showed that both have equivalent performance. However, the MPR model provides an important reduction on the deviations values, indicating that with the addition of new atmospheric factors in the models, the improvement can be considerably higher.

[0321] ATMOSPHERIC COMPOSITION AND STRUCTURE / Cloud/ radiation interaction

[0360] ATMOSPHERIC COMPOSITION AND STRUCTURE / Radiation: transmission and scattering

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