A comparative study on SPCTRAL2, SPCTR-1881 and SMARTS2 models using direct normal solar irradiance in different bands for Cairo and Aswan, Egypt

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Abstract:
The estimated values of Direct Normal Solar Irradiance (DNSI) in different bands, using the three spectral models SPCTRAL2, SPCTR-1881 (modified SPCTRAL2) and SMARTS2, are compared to corresponding values measured in a polluted (urban/industrial) area of Cairo and an unpolluted area in Aswan. The measured data of DNSI are used as input to all models, while some of these data have been selected (56 measurements for Aswan and 94 for Cairo) to cover different atmospheric conditions in the period 1991-1996. The statistical indicators, t-statistic and absolute percentage error epsilon%, show that SPCTRAL2 model is not suitable for estimatiom of DNSI in, the visible band b(2) (530-630 nm), but it is more suitable in the infrared band b(4) (695-2900 nm). SPCTR-1881 model is not suitable for estimation of DNSI in b(4). but it is efficient for b(2). SMARTS2 model is the most suitable for most bands with the lowest percentage deviation, so that the epsilon% range for Cairo is 0.93-5.2% with t-values in the range 0.002-0.006 with angstrom ngstrom turbidity parameters alpha = 0.4 and beta = 0.21-0.28. For Aswan the epsilon% range is 0.74-4.29% with t-values in the range 0.019-0.181 (alpha = 0.8 and = 0.12-0.14). (c) 2005 Elsevier Ltd. All rights reserved.

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Determination of Angstrom coefficients from spectral aerosol optical depth at two sites in Egypt

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Abstract: Angstrom Turbidity Coefficients (ATC) are estimated from Aerosol Optical Depth by using spectral broadband data. These data are carried out from Pyrheliometric measurements in the period 1991-96 for two sites of different climatological and environmental view; the first one is a highly polluted urbanized site (Cairo), while the other is an unpolluted and site (Aswan). SMARTS2 model proposed by Gueymard and SPCTRAL2 model proposed by Bird and Riordan, with two pairs of spectral broadbands, are used to select the suitable spectral broadband for estimating ATC. The turbidity levels increase during the two transition seasons, spring (due to Khamasin depressions coming from Great Sahara) and autumn (due to extend of Sudan monsoon trough), in addition to summer season. The subsidence inversion is stronger and leads to trap the pollution in the boundary layer in summer. The mean average values of ATC, over the all period, are alpha=0.477, 0.817 and beta=0.283, 0.144 for Cairo and Aswan respectively. Turbidity level in Cairo is higher than that in Aswan because the two big industrial areas Helwan and Shoubra El-Kheima surround Cairo, in addition to traffic.

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Uses of sunshine duration to estimate the global solar radiation over eight meteorological stations in Egypt

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Abstract:

The climatological Angstrom regression coefficients have been determined by three methods and used to predict the global solar radiation over eight meteorological stations. Each of the three methods depends on the correlation between two ratios. The first ratio is between the long period of monthly average sunshine duration (s) over bar and the corresponding maximum of daily sunshine duration (day length) N, and the second ratio is between the measured monthly average daily global solar radiation (H) over bar and the corresponding monthly mean daily extraterrestrial solar radiation on the horizontal surface (H) over bar(0). A comparison between the measured data and the estimated values has been done. The t-statistics is used as a statistical indicator to choose the coefficients of the best method that gives a percentage of error less than 10%.

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Studying the extinction coefficient due to aerosol particles at different spectral bands in some regions at great Cairo

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Abstract:
Extinction coefficient due to aerosol has been estimated by Pyrheliometric and Gorgie type Actinometric measurements in the industrial, urban areas and compared with agricultural areas. The measurements distributed over one year from June 1992 to May 1993 were made under clear sky for five spectral bands. The results show two maxima in hot wet and spring months and minimum in winter months, but there is a fluctuation in urban area. Diurnal variations show maximum at noon especially in the industrial area. Level of extinction coefficient in the industrial and urban area is greater than that of the agricultural area, except for hot wet months is due to the increase of water vapor content in agricultural area. Spectral distribution of the extinction coefficient decreases monotonically with wavelength. Size of particles in industrial area is greater than in urban and agricultural areas. The temperature and water vapor content have important rules in increasing the extinction coefficient of aerosols.

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Power spectra analysis for world-wide and North Africa historical earthquakes data in relation to sunspots periodicities

Author(s): Shaltout, MAM (Shaltout, MAM); Tadros, MTY (Tadros, MTY); Mesiha, SL (Mesiha, SL)

Source: RENEWABLE ENERGY Volume: 17 Issue: 4 Pages: 499-507 DOI: 10.1016/S0960-1481(98)00775-7 Published: AUG 1999

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Abstract:
In the last three decades, the influence of solar activity on earth seismicity is one of the most important subjects in the field of long-term prediction of earthquakes.

In the present work, the autocorrelation and power spectra analysis were applied for the sequences of sunspots and earthquakes activity. The used data are the worldwide earthquakes of M greater than or equal to 5, and the sunspots number R-z, for the period 1903-1985. Both are available from the National Oceanic and Atmospheric Administration NOAA, Boulder, Colorado, U.S.A. Also, we restrict our attention to earthquakes in North Africa with two stations, one at Cairo (Egypt), and the other at Alger (Algeria) of M greater than or equal to 4 for the period (1900-1986).
The results indicated the presence of the eleven year cycles of the sunspots into the time of the earthquakes of the North Africa. Also, from the worldwide and North Africa earthquakes data a periodicities ranged between 1.01 and 5.5 years are revealed, which may be linked to a solar activity cycle.

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