



## **Evaluating trends in solar radiation based on data fields from the NCEP/NCAR reanalysis and measurements**

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Net radiation ( $R_n$ ) is a result of the energy exchange between the atmosphere and the land/ocean surface and it can be used for many purposes, including agricultural meteorology, weather prediction and climate research. The database from the National Centers for Environmental Prediction/National Center for Atmospheric Research (NCEP/NCAR) reanalysis available for the period 1948-2006 can be used for obtaining long-term solar radiation under a large region. The study area is northeast Brazil region (covering an area of about 1.5 million square kilometers) using monthly time-series of  $R_n$  and outgoing longwave radiation (OLR) at the top of atmosphere from the NCEP/NCAR Reanalysis Project and annual mean time-series of global solar radiation measurements. Long-term variability of  $R_n$  and OLR data was assessed by Mann-Kendall test (M-K). Annual time-series of measured global solar radiation for the period from 1979 to 2006 for some locations of the study area were also analyzed by M-K test at  $p < 0.01$  and  $p < 0.05$  significance levels. Most of the  $R_n$  and OLR time-series showed statistically significant decreasing trends widespread throughout the study region. The decreases in both  $R_n$  and OLR are attributed to the increasing levels of carbon dioxide into the atmosphere. Global solar radiation showed a decreasing trend for a semi-arid site of northeast Brazil (Petrolina region) of  $0.10 \text{ MJ m}^{-2} \text{ d}^{-1}$  per year, which is statistically significant at  $p < 0.01$  significance level. Once this region is rapidly expanding economically, the decrease in solar radiation can also be an indication of increasing air pollution.