



On the relative role of clouds and aerosols in the decadal changes of solar radiation

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This study aims at quantifying the most important factors for the decadal variations in the surface shortwave downward radiation. With reports describing global variations of this radiation parameter using surface and satellite-derived measurements, emphasis has recently been placed on regional studies to further understand the mechanisms that are contributing to the local changes in solar radiation. Analysis of this radiative parameter is performed on surface observations in Europe from the Global Energy Balance Archive (GEBA) from 1970 through 2005. This dataset is comprised of monthly mean surface downward radiation around the globe. The time series of these measurements are evaluated on an annual and seasonal basis to determine their trends using linear regression techniques. Since cloud cover and aerosols are major contributors for the variability of solar radiation, we assess the relative role of these two factors. Time series of cloud cover are taken from the Carbon Dioxide Information Analysis Center (CDIAC) from 1971 to 1996. Monthly averages from this dataset are used to compute annual and seasonal trends. In addition, decadal changes in the total aerosol optical depth from the Goddard Chemistry Aerosol Radiation and Transport (GOCART) model are analysed. The effect of cloud cover and aerosols on surface shortwave downward radiation is evaluated through generalized linear models where these two factors act as covariates.