



Yearly changes in solar radiation over New Caledonia and relations with changing atmospheric properties

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New Caledonia, a large island in Tropical Pacific Ocean, experiences a very sunny weather. As an average, approximately 60 % of the solar radiation available at the top of atmosphere reaches the ground. Solar radiation is an option for energy production. Because of the low cloudiness, direct solar radiation received on a plane normal to the sun rays (DNI) is large and this raises interest in exploitation of concentrating solar technologies (CST) that concentrate sun rays to produce electricity. A preliminary study has been performed to assess the potentials of DNI. Local measurements reveal a decrease in direct and global solar radiation since 2004. DNI has decreased by 15 % over 10 years and the global radiation on a horizontal surface by 10 %. One reason is an increase in cloudiness. The ICOADS (International Comprehensive Ocean-Atmosphere Data Set) of the NOAA shows an increase from 2004 to 2006 but then a slightly declining plateau of the cloud cover for the area comprised between -18° and -22° N and 157° to 163° E. Cloud cover cannot be the sole cause of the decrease in solar radiation. Another reason is an increase in aerosol load. The MACC (Monitoring Atmosphere Composition and Climate) projects, funded by the European Commission, provide data sets on aerosol properties, from 2004 till present, as well as total column contents in water vapor and ozone. These data sets are a valuable tool to describe the dynamics of aerosol from year to year. Analysis of these data and estimates of the DNI and global radiation in clear sky conditions provided by the McClear model exploiting the MACC data sets reveal an increase in the optical depth of the aerosols that yields a decrease of the DNI under clear sky conditions related to the decrease of the observed DNI.