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Atmos. Chem. Phys., 7, 5775-5783, 2007
www.atmos-chem-phys.net/7/5775/2007/

Effects of total solar eclipse of 29 March 2006 on surface radiation

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Abstract. Solar irradiance spectral measurements were performed during a total solar eclipse. The spectral effect of the limb darkening to the global, direct irradiance and actinic flux measurements was investigated. This effect leads to wavelength dependent changes in the measured solar spectra showing a much more pronounced decrease in the radiation at the lower wavelengths. Radiative transfer model results were used for the computation of a correction for the total ozone measurements due to the limb darkening. This correction was found too small to explain the large decrease in total ozone column derived from the standard Brewer measurements, which is an artifact in the measured irradiance due to the increasing contribution of diffuse radiation against the decreasing direct irradiance caused by the eclipse. Calculations of the Extraterrestrial spectrum and the effective sun's temperatures, as measured from ground based direct irradiance measurements, showed an artificial change in the calculations of both quantities due to the fact that radiation coming from the visible part of the sun during the eclipse phases differs from the black body radiation described by the Planck's law.

Final Revised Paper (PDF, 718 KB) | Discussion Paper (ACPD)

Citation: Kazadzis, S., Bais, A., Blumthaler, M., Webb, A., Kouremeti, N., Kift, R., Schallhart, B., and Kazantzidis, A.: Effects of total solar eclipse of 29 March 2006 on surface radiation, Atmos. Chem. Phys., 7, 5775-5783, 2007. Bibtex | EndNote | Reference Manager

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