

Water Vapor Continuum Absorption of Solar Radiation Tested Using ARM Data

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Introduction

A high quality data set collected at the Atmospheric Radiation Measurement (ARM) Southern Great Plains (SGP) central facility is analyzed to identify the water vapor continuum absorption of solar radiation. We focus on the direct solar broadband surface irradiances under cloud-free conditions in the April 1994 CAGEX^(a) and summer 1996 periods. A radiation model without including the H₂O continuum in the solar spectrum is compared with observations. This comparison reveals a mean bias of 4.5 W m⁻² that is roughly equivalent to a globally averaged bias of ~2 W m⁻². It is therefore unlikely that the excess absorption suggested by recent studies can be attributed to the H₂O continuum. We also show that the difference between calculated and observed irradiances has a very weak correlation with water vapor. It is suggested that

uncertainties associated with the aerosol optical depth need to be reduced to further narrow the magnitude of the H₂O continuum absorption of solar radiation. See Fu et al. (1998) for more details.

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References

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(a) Cloud and Earth Radiant Energy System (CERES)/ARM/Global Energy and Water Cycle Experiment (GEWEX).