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ATMOSPHERIC AEROSOL VARIABILITY OVER THE REGION OF SAN PEDRO MÁRTIR FROM MODIS DATA

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RESUMEN

Se presenta un estudio del espesor óptico del aerosol atmosférico (AOT por sus siglas en inglés) en el sitio astronómico de San Pedro Mártir, B. C., México durante el periodo 2000–2008. Las mediciones del AOT se realizaron con el instrumento *Moderate Resolution Imaging Spectroradiometer* (MODIS), a bordo de los satélites *Aqua* y *Terra* de la NASA. Se han identificado valores característicos estacionales que muestran un comportamiento de mayor transparencia atmosférica durante el otoño. Las mejores condiciones de transparencia atmosférica ocurren durante octubre y noviembre. El comportamiento anual durante 2000–2008 del AOT de MODIS da valores promedio de 0.147 ± 0.103, 0.128 ± 0.090, 0.115 ± 0.081, 0.087 ± 0.066 en 4700, 5500, 6600 and 21300 Å, respectivamente. Utilizando estos valores promedio se analizó la dependencia del AOT con la longitud de onda, y se encontró que $\alpha_{\rm OIR} \sim 0.31 \pm 0.06$ y la relación $\tau_\lambda \sim 0.0061\lambda^{-0.31}$ para dispersión por aerosoles en el sitio de San Pedro Mártir.

ABSTRACT

A study is presented of the atmospheric aerosol optical thickness (AOT) in the astronomical site of San Pedro Mártir, B. C., Mexico, during the 2000–2008 period. The AOT measurements were made by the *Moderate Resolution Imaging Spectroradiometer* (MODIS) instrumentation, on board of the NASA *Aqua* and *Terra* satellites. Characteristic seasonal values were identified, showing a higher atmospheric transparency in autumn. The best conditions for atmospheric transparency occur in October and November. The annual behavior of MODIS AOT yields average values for SPM during the years 2000–2008 of 0.147 ± 0.103, 0.128 ± 0.090, 0.115 ± 0.081, 0.087 ± 0.066 at 4700, 5500, 6600 and 21300 Å, respectively. We used these mean values to analyze the wavelength dependence and found aerosol scattering slopes $\alpha_{\rm OIR} \sim 0.31 \pm 0.06$, and a relation $\tau_\lambda \sim 0.0061\lambda^{-0.31}$, for aerosol scattering over the San Pedro Mártir location.

Key Words: atmospheric effects — site testing

1. INTRODUCTION

Until recently, the measurements of the atmospheric opacity of aerosol were obtained on ground-based observing stations as AERONET from NASA, that has more than 100 stations distributed around the world. It is not until 2000 and 2002 that the operation of the NASA satellites *Terra* and *Aqua* started, and systematic measurements at different geographic locations of the atmospheric aerosol optical thickness (AOT), among many other parameters, were made available. The ambient AOT of different locations around the world have been obtained using these satellites and compared to AERONET data in several publications (e.g., Ichoku et al. 2002, 2004; de Meij et al. 2006; Pires, Correia, & Paixao 2007; Green, Kondragunta, & Ciren 2008; Xia et al. 2008), to study AOT variations.

The characterization of astronomical sites (e.g., Muñoz-Tuñón, Sarazin, & Vernin 2007; Schöck et al. 2007; Tapia et al. 2007) require a detailed and long term testing, in terms both of precision and variability, of a variety of characteristics includ-