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RECALIBRATED TURBULENCE PROFILES AT SAN PEDRO MÁRTIR

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RESUMEN

La calibración de perfiles de turbulencia óptica (C_N^2) medidos con el método SCIDAR generalizado ha sido recientemente revisada y corregida por Avila & Cuevas (2009). Basándonos en ese trabajo, aquí presentamos la corrección de todos los perfiles de C_N^2 medidos con el SCIDAR generalizado en el Observatorio Astronómico Nacional de San Pedro Mártir. El perfil de C_N^2 mediano corregido conserva su estructura vertical general. El cociente promediado en altura de la mediana de los valores de C_N^2 corregidos sobre la mediana de los valores no corregidos es igual a 0.87. La mediana del *seeing* corregido en el sitio es $0\farcs68 \pm 0\farcs03$, 4.2% menor que la mediana no corregida. Las medianas del *seeing* producido por turbulencia en los dos primeros kilómetros de altura sobre los telescopios de 1.5 m y 2.1 m de diámetro decrecen en un 15.8% y 13.6%, respectivamente. El ángulo isoplanático corregido tiene una mediana de $1\farcs96 \pm 0\farcs04$.

ABSTRACT

The calibration of optical turbulence (C_N^2) profiles measured with the generalized SCIDAR technique has been recently reviewed and corrected by Avila & Cuevas (2009). Based on that work, here we present the correction of all the C_N^2 profiles measured with a generalized SCIDAR at the Observatorio Astronómico Nacional of San Pedro Mártir. The median corrected C_N^2 profile conserves its overall vertical shape. The altitude-averaged ratio of the corrected median C_N^2 values over the uncorrected ones equals 0.87. The corrected median value of seeing at the site is $0\farcs68 \pm 0\farcs03$, 4.2% lower than the median value obtained with the uncorrected profiles. The median values of the seeing produced by turbulence in the first 2 km above the 1.5 m and the 2.1 m telescopes decrease by 15.8% and 13.6%, respectively. The corrected isoplanatic angle has a median value of $1\farcs96 \pm 0\farcs04$.

Key Words: atmospheric effects — instrumentation: high angular resolution — site testing

1. INTRODUCTION

Scintillation detection and ranging (SCIDAR) is an efficient technique to measure optical turbulence profiles, that is, the vertical distribution of the refractive-index structure constant, $C_N^2(h)$. The method is based on the determination of the normalized spatial autocovariance of the intensity distribution (scintillation) detected on the pupil plane of a telescope. The first version of this technique (Rocca, Roddier, & Vernin 1974) –known as Classical SCIDAR– was only sensitive to turbulence located higher than one kilometer above the ground, thus failing to detect turbulent layers near the ground, which are now known to be the most intense (Avila, Vernin, & Cuevas 1998; Egner, Masciadri, & McKenna 2007; Fuensalida et al. 2007; Chun et al. 2009; García-Lorenzo et al. 2009; Masciadri et al. 2010). Fuchs, Tallon, & Vernin (1994) proposed that turbulence near the ground would be measurable if instead of recording the scintillation on the telescope pupil plane, the detector was made the

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