conjugate of a virtual plane located a few kilometers below the pupil (analysis plane). Avila, Vernin, & Masciadri (1997) put that idea in practice for the first time, showing its efficiency. This new configuration, called Generalized SCIDAR (GS), has been vastly used to characterize astronomical sites (Avila et al. 1997; Fuchs, Tallon, & Vernin 1998; Klückers et al. 1998; Avila et al. 1998; Kern et al. 2000; Avila, Vernin, & Sánchez 2001; Prieur, Daigne, & Avila 2001; Wilson et al. 2003; Avila et al. 2004; Tokovinin et al. 2005; García-Lorenzo & Fuensalida 2006; Egner et al. 2007; Vernin et al. 2007; Egner & Masciadri 2007; Avila et al. 2008; Fuensalida, García-Lorenzo, & Hoegemann 2008; García-Lorenzo & Fuensalida 2011; Masciadri et al. 2010). The method and the physics involved in either version of the SCIDAR technique have thoroughly been treated by a number of authors (Rocca et al. 1974; Vernin & Azouit 1983a,b; Klückers et al. 1998; Prieur et al. 2001).

Recently, Avila & Cuevas (2009) –inspired by Johnston et al. (2002)– demonstrated that the algebraic method customarily used in GS for the normalization of the scintillation autocovariance leads to overestimated C_N^2values, and proposed a procedure for the correct recalibration of the turbulence profiles. The relative error can take values from zero to a factor of 4, depending on the telescope size, the double star used as source, the position of the analysis plane and the turbulence altitude. Until now, turbulence profiles at Mt Graham (Masciadri et al. 2010) and El Teide (García-Lorenzo & Fuensalida 2011) observatories have been recalibrated using that procedure.

In 1997 and 2000, GS measurements were carried out at the Observatorio Astronómico Nacional de San Pedro Mártir (OAN-SPM), Baja California, Mexico. Avila et al. (2004, hereafter A04) report a statistical analysis of the $C_N^2(h)$ measured in both campaigns. Avila et al. (1998) present the results of the 1997 campaign and Avila et al. (2006) give a statistical analysis of wind speed profiles and wavefront coherence time. In view of the newly discovered calibration issue, a reanalysis of the GS results at the OAN-SPM is in order. Here we present the correction of the C_N^2 values and its implications on the statistical description of the seeing and isoplanatic angle. In § 2 the observation campaigns and original data are described. § 3 is devoted to the description of the C_N^2 values correction and the statistical analysis of the corrected turbulence profiles is presented in § 4. Finally the discussion and conclusions are given in § 5.

TABLE 1

TELESCOPES WHERE THE GS WAS INSTALLED

	Diameter (D)[a]	Secondary over Primary (e)
SPM2.1	2.1	0.27
SPM1.5	1.5	0.26

[a]In meters.

2. OBSERVATION CAMPAIGN AND DATA OVERVIEW

Two GS observation campaigns have been carried out at the OAN-SPM in 1997 and 2000, respectively. In 1997, the GS was installed at the 1.5 m and 2.1 m telescopes (SPM1.5 and SPM2.1) for 8 and 3 nights (1997 March 23–30 and April 20–22 UT), whereas in 2000 the instrument was installed for 9 and 7 nights (May 7–15 and 16–22 UT) at SPM1.5 and SPM2.1. It is fair to mention that in the 2000 campaign additional instruments (Masciadri, Avila, & Sánchez 2004) were deployed, even though they have no impact on the present article.

The numbers of $C_N^2(h)$ samples obtained in 1997 and 2000 were 3398 and 3016, respectively, making a total of 6414. The altitude scale of the profiles refers to altitude above sea level (2800 m at OAN-SPM). In GS data, part of the turbulence measured at the observatory altitude is produced inside the telescope dome. For site characterization, this contribution must be subtracted. In all the analyses presented here, dome turbulence has been removed using the procedure explained in A04. Almost all the time the most intense turbulence was located at the observatory altitude.

3. C_N^2VALUES CORRECTION

The GS technique is based on the estimation of the normalized spatial autocovariance $\mathcal{C}$ of a double-star scintillation recorded on a virtual plane located a distance d below the ground (of the order of a few kilometers). The procedure to estimate the scintillation autocovariance is to compute the mean autocorrelation of double-star scintillation images, normalized by the autocorrelation of the mean image. In the classical SCIDAR –where images are taken at the telescope pupil– this computation leads analytically to $\mathcal{C}$ (Rocca et al. 1974). However for the GS, Johnston et al. (2002) show that the result of this procedure is not equal to $\mathcal{C}$. The discrepancy is due to the shift of the out-of-focus pupil images pro-