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Night Sky Extinction Measurements at the Indian Astronomical Observatory, Hanle

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Abstract. We present the estimates of the night sky extinction at the Indian Astronomical Observatory. Also presented are the estimates of the night sky brightness. The extinction in the *U* band at IAO is found to be lower than the value expected theoretically for an altitude of 4500 m.

1. Observations

Standard photometric fields were observed in the *UBVRI* bands using the 2-m Himalayan Chandra Telescope (HCT) during 2000 December, 2002 October, 2002 November, 2002 December and 2003 January. All data were bias subtracted and flat field corrected using twilight sky flats. The instrumental magnitudes of the stars were estimated using aperture photometry.

2. Results: Extinction Coefficient and Night Sky Brightness

The extinction due the Earth's atmosphere in any band is estimated as the slope of a least-squares fit to the observed instrumental magnitudes of the star, in that band, obtained at different airmass or zenith distances.

Data from 13 nights in 2000 December, 2 nights in 2002 October, 5 nights in 2002 November, 1 night in 2002 December and 2 nights in 2003 January were used to estimate the extinction coefficient in each of the *UBVRI* bands, individually for each night. The measurement errors are ≤ 0.01 in the *U* and *B* bands, while the errors are ≤ 0.006 in the *VRI* bands. We list in Table 1 only the mean extinction coefficients in the *UBVRI* bands, along with the r.m.s about the mean value, estimated for the period 2000 December, and 2002 October – 2003 January. The mean extinction curve for IAO is plotted in Figure 1. Also plotted in the same figure are the mean extinction coefficients in the *UBVRI* bands for IAO and Mauna Kea (ref: CFHT Bulletin, #19, p.16 1998), as well as the value expected theoretically for an altitude of 4500 m (Bessell 1990).

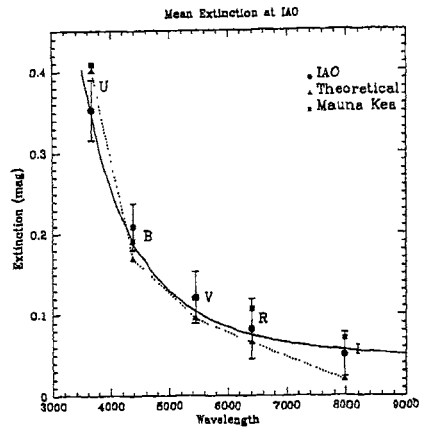

Figure 1. Mean extinction curve plotted for IAO. Also shown are the mean extinction values in the *UBVRI* bands for IAO, Mauna Kea and the theoretical values for an altitude of 4500 m.

Table 1. Mean extinction (2000 Dec, 2002 Oct – 2003 Jan) and night sky brightness at IAO.

Band	Extinction mag	no.*	Sky brightness mag/arcsec^2
U	0.353 ± 0.037	23	23.64 ± 0.57
B	0.209 ± 0.029	23	22.94 ± 0.50
V	0.121 ± 0.032	23	21.52 ± 0.21
R	0.0823 ± 0.037	23	20.20 ± 0.35
I	0.0497 ± 0.027	23	18.60 ± 0.21

*: No. of nights

The extinction coefficients presented here are consistent with the previous estimates obtained in 1995 March and June (HIROT Team 1996).

The night sky brightness in the *UBVRI* bands has been estimated on 2002 November 29 and 2002 December 29. The present estimates are consistent with the previous estimates obtained in 1995 (HIROT Team 1996). The mean night sky brightness in the *UBVRI* bands is listed in Table 1.

References

Bessell, M.S. 1990, PASP, 102, 1181
HIROT Team, 1996, BASI, 24, 859