RESEARCH PROGRAMMES, PRODUCTIVITY, AND USAGE STATISTICS FOR THE 0.9M TELESCOPES AT KITT PEAK

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ABSTRACT: Current research programmes using the smaller telescopes at Kitt Peak include spectroscopy, photometry, and imaging of clusters, variable stars, nebulae, and extragalactic objects. Their scientific productivity is competitive with the 4m and 2.1m telescopes. Subscription rates indicate that when advanced instrumentation is made available on a small telescope, the demand will increase significantly.

1. THE KITT PEAK TELESCOPES

There are currently 7 primary telescopes for night-time use at KPNO, with apertures of 4, 2.1, 1.3, (two) 0.9, 0.6 meters and Coude feed. The two 0.9m telescopes have an instrument complement consisting of a CCD camera as the principle instrument at the #1-0.9m, and the Intensified Reticon Spectrograph (IRS) at the #2-0.9m.

The most significant attractions offered by the 0.9m telescopes are (1) modern instrumentation, (2) relatively generous time allocations, (3) efficient operation with reduced complexity, (4) a lower pressure environment, and (5) reduced scale to image larger fields or utilize large apertures and long slits in spectrophotometry.

Average dark-time oversubscription rates for the KPNO telescopes are given in Table I.

TABLE I

Telescope	4m	2.1m	1.3m	#1-0.9m	#2-0.9m	CF
1978 - 1985	3.0	2.1	1.4	1.9	1.4	1.4
1983 - 1985	2.8	1.9	1.5	2.1	1.5	1.5

Statistically there has been no real change in the subscription rate over the long term. There are smaller scale changes as shown in Figure 1 for the #1-0.9m telescope. This figure charts the demand for the telescope relative to the 4m thereby reducing seasonal effects. The demand has varied by a factor of nearly three, due in part to the availability of new instumentation.

J. B. Hearnshaw and P. L. Cottrell (eds.), Instrumentation and Research Programmes for Small Telescopes, 237–239.

The presence of the IRS had little effect, but the impact of the CCD direct camera was obvious. Two semesters after availability, the subscription rate exceeded that of the 4m; apparently projects previously requiring 2.1m and 4m telescopes were now feasible at the #1-0.9m. The high demand prompted transfer of the IRS to the #2-0.9m so that the CCD could be simultaneously scheduled. The subscription rate dropped thereafter, and was reduced further when the CCD camera became available at the 2.1m.

2. PRODUCTIVITY

Abt (1980, P.A.S.P., 92, 249) showed that the scientific paper rate was roughly proportional to telescope aperture using data for the KPNO telescopes from 2.1m and smaller. Figure 2 shows the result for papers published during the past 2 years. The nearly linear trend is still evident. Abt explains the relationship as a result of large telescope usage directed toward fainter objects, and that the number of observer teams follows a roughly linear aperture relationship. One must also consider that because the larger telescopes are more heavily subscribed, allocation committees are more selective toward productive investigators.

Although, paper rates may not be a particularly good indicator of scientific productivity, current data support the trends found by Abt which suggest that small telescopes are scientifically cost effective.

3. RESEARCH PROGRAMMES

KPNO receives roughly 140 proposals for the two 0.9m telescopes each year. About half propose extragalactic studies. The major areas of recent research are optical properties of radio galaxies, surface photometry of galaxies, active galactic nuclei, populations in nearby galaxies, studies of variable stars, active chromospheres of stars, star formation and young stellar objects, lunar occultations, and recently, comet investigations.

One effect of heavy CCD and IRS scheduling has been a reduction in classical photometry. We are studying ways to use CCD cameras as photometers to relieve the demand for instrument changes, and to provide a much fainter limit resulting from the greater sensitivity and the areal properties of CCDs.

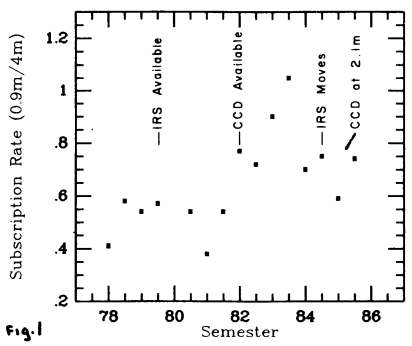

Fig.1

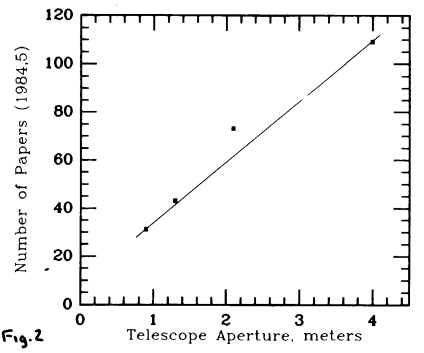

Fig.2

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DISCUSSION

Kumar: Can you comment on the fringing effects with CCDs and narrow band filters?

Jacoby: We find the TI chips relatively immune, the RCA chips have some fringing effects which in many cases can be removed by flat fields. Problems arise when two strong emission lines fall within one bandpass, e.g. NII and Hα.

Warner: It is not yet possible to phase out photomultipliers completely (in favour of CCDs) because of the continuing need for high time resolution photometry. CCDs are limited by their read-out time (~1 second).

Jacoby: To a large entent this is true but we have been experimenting with scanning the CCD in rapid mode to get a resolution of ~1 second.

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