

PHOTOMETRIC CALIBRATORS FOR ALL-SKY SURVEYS: THE GSPC-II PROGRAM

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1. Program Outline

Accurate astrometric and photometric calibrations of all-sky photographic surveys, such as the Palomar Quick-V survey and the UK SERC-J survey, digitised for the construction of the Hubble Space Telescope Guide Star Catalog, are of extreme astrophysical value. Their wide range of applications includes, for example, galactic structure, stellar populations, extragalactic studies, and deep sky catalogs for mission planning and telescope operations. The Guide Star Photometric Catalog (GSPC-I, Lasker et al. 1988) provides stellar calibration sequences, placed approximately in the center of each survey plate, with a limiting magnitude of $V = 15$ mag. The goal of our program is to extend these calibrators to $V = 20$ mag in the Johnson-Kron-Cousins B, V and R passbands, with an accuracy of 0.05 mag. This is accomplished by taking CCD frames centered on the faintest star of each GSPC-I sequence. Typically, both long and short exposures are acquired in each field in order to link the bright and faint ends of the sequence.

Within the magnitude range of the calibrators, stellar photometry can be done by non-linear fitting to instrumental magnitudes; outside the sequence range and for non-stellar objects, PSF fitting to recover the response curve (see e.g. Bunclark 1982) is required.

This program is made possible by the availability of long-term observing status on several 1 – 2 m telescopes with CCD cameras. A prospectus of the different observatories/instruments contributing to this project, along with their sky region assignments, can be found in Postman et al. (1992).

Transformation to the standard system is achieved via observations of standard stars taken from Landolt (1992); see Ferrari et al. (1993) for more details. Homogeneity being critical to the calibration of all-sky astrophysical programs, external checks, based on standard photometric fields and fields in common among the different sites, are routinely made.

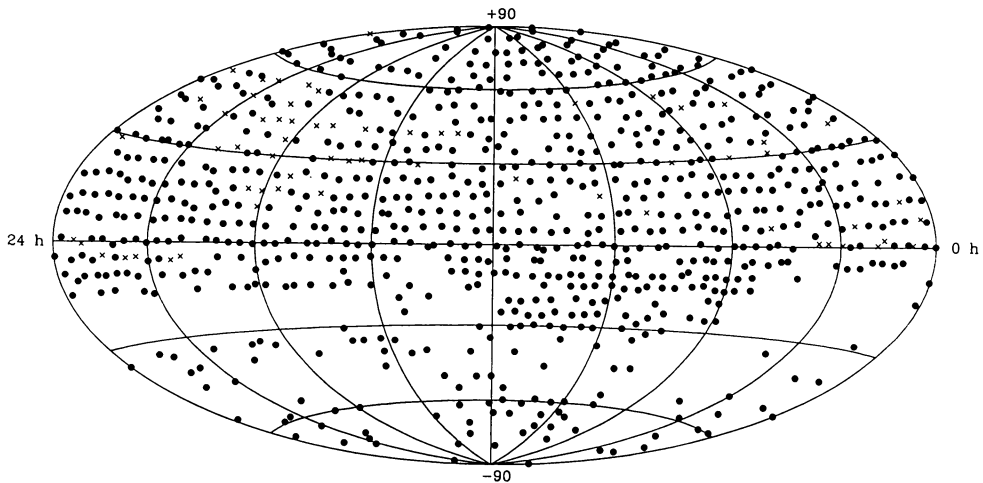
2. Reduction Status

There are 583 northern ($\delta \geq 6^\circ$) fields, centered on the original POSS-I plates, and 894 southern ($\delta \leq 0^\circ$) fields, centered on the plates of the UK SERC Southern Sky Survey and its equatorial extension. In view of the on-going digitization of the POSS-II survey, for which the plate centers differ from those of the POSS-I fields, a supplemental program of about 150 northern fields is also planned. Table 1 shows the present sky coverage and status of the data reduction and a pictorial representation of the program is given in Fig. 1.

Analysis of the fitting of Landolt reference stars and checks against standard reference fields show that the program's 5% accuracy goal is being achieved.

Table 1 Observing and Reduction Status

EXPOSURES	NORTH		SOUTH	
	SHORT	LONG	SHORT	LONG
Data fully reduced	72%	23%	30%	20%
Data unreduced	9%	30%	1%	1%



Good (●) and Unreduced (x) GSPC-II Data (8/11/93)

Figure 1. Sky map indicating the completeness of the program.

3. Program Completion

Given the large number of target fields, telescope time is the major factor in setting the pace of our program. At the current rate, we will be able to complete both hemispheres in three years, although short-exposure coverage will require less time. Since the bright end of GSPC-II ($V \sim 18$ mag) is in itself astrophysically important, we are trying to balance its earlier completion with the inefficiency of later reobserving the same field for the long exposure frame.

The program is most complete near the equator. In the -5° , 0° , $+6^\circ$ and $+12^\circ$ zones, over 90% of the short-exposure sequences have been observed and the data reduced. Because of the completeness and the accessibility of these fields to observatories in both hemispheres, we plan to publish this region of the GSPC-II first.

Acknowledgements

We acknowledge the observing time at the following observatories: CTIO, ESO, KPNO, Lowell, McDonald, Megantic, San Diego State University and Wise. We thank N. Brosch, E. Costa and C. Lopez for participation in the observing. This work is supported, in part, by the Italian Space Agency under contract ASI 1992 RS778 and by NASA Grant NAGW-3644. ST ScI is operated by AURA Inc. for NASA.

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