Photography in Wide-field Imaging

Photographic Sky Surveys

The first all-sky photographic survey was the multi-national Carte Du Ciel project, carried out on standard astrographic telescopes during the first third of this century. Several other surveys followed on small wide-field telescopes but new standards of depth and resolution were set by the first survey done by a large Schmidt telescope, the Palomar Observatory-National Geographic northern sky survey of the 1950s. This was followed by the joint ESO/SERC southern sky survey carried out from 1975 to 1985. At the present time the Oschin Schmidt at Palomar and the UK Schmidt at the Anglo-Australian Observatory are carrying out matching second epoch surveys of the entire sky, as well as extending the surveys into the near infrared. There have also been numerous special purpose or limited area surveys, for example using objective prisms or interference filters.

The surveys have been and are being used for an ever-increasing range of purposes: some involve selecting specific objects out of the multitude recorded, such as searches for rare objects or the identification of radio or X-ray sources; others exploit statistical data for large samples in studies of Galactic structure or the large scale structure of the Universe. The usefulness of the surveys has been enormously extended with the advent of fast automatic plate measuring machines. Some types of investigation requiring many exposures of the same field, such as precise astrometry or variability searches, are just beginning to be done systematically and have great potential. Substantial gains in sensitivity are still available with new emulsions and through plate combination techniques. However, the last few years have seen a dramatic increase in the size and sensitivity of CCD detectors and these now rival photographic plates for large scale surveys. Thus it is time to look carefully at the future of photography for sky surveys and to concentrate on those applications which require the large format and high resolution of photographic emulsions.

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Microspots on Kodak Emulsions

This paper describes recent checks for microspot (gold spot) contamination which have been made on plates held in the ROE Plate Library. Original plates found to be affected by non-reflecting spots in 1990 have been re-examined to see if these spots become reflective with time. During the checks made in 1990 it was discovered that plates exposed and processed in a period between June 1982 and July 1984 were free from contamination although plates exposed both before and after this period were affected. These plates have been rechecked to see if they are still spot free.

Many plates have been bathed in selenium toner; the efficacy of this treatment has been checked by comparing the incidence of spot formation on toned and untoned plates exposed at the same time.

Plates most affected by spot formation are IIIa-J, IIIa-F and IV-N emulsions. Other emulsions, including process plates, have been checked to see which are susceptible to spot formation.

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Kodak Technical-Pan: New Light on an Old Emulsion

Kodak Tech-Pan emulsion is an extremely fine grained, high resolution, pan-chromatic negative film with extended red sensitivity. It has been available in various formats for well over a decade, being widely used by the amateur astronomical community with great success.

However, professional observatories have been very slow to adopt the material due to early hypering difficulties with the glass based emulsion and then with problems obtaining fully focused large-format Tech-Pan films at the curved focal surfaces of major Schmidt telescopes. These difficulties have recently been overcome at the UK Schmidt telescope (UKST) and Tech-Pan films are now routinely obtained. These Tech-Pan exposures exhibit excellent image quality and typically go ~1 magnitude fainter than the equivalent IIIa-F emulsion on glass but with considerably lower grain noise and greater photometric accuracy. This makes hypered Tech-Pan an obvious and much cheaper alternative to IIIa-F to which it seems superior in nearly every respect. Early concerns about the astrometric integrity of the film based Tech-Pan appear to be unfounded. Examples and comparisons of images on Tech-Pan and IIIa-F are discussed.

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