

THE MARIA MITCHELL OBSERVATORY PLATE COLLECTION

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Abstract

The Maria Mitchell Observatory collection of photographic plates has been a resource for variable star studies for many years. The properties, characteristics, and components of the plate collection are reviewed and ways to achieve its fullest utilization are discussed.

1. Introduction

Over the years, many papers have presented variable star studies based on the plate collection at the Maria Mitchell Observatory. Astronomers and student researchers have frequently focused on period changes in RR Lyrae and Cepheid variables.

As we look to a broader and fuller use of the plate collection in future years, I would like to take this opportunity to reintroduce readers to the properties and characteristics of our collection.

2. Overview of the Plate Material

The Maria Mitchell Observatory (MMO) plate collection began in 1913, with the installation on Nantucket of the 7.5-inch Cooke telescope. The Cooke provides a plate scale of 240"/mm, which, projected to 8 x 10 inch plates, affords a field size of 13.5 x 17 degrees on the sky. The vast majority of the plates are sensitive to blue light.

Over the past 80 years, more than 200 students and assistants and four directors have contributed to the observations, bringing the number of MMO plates to almost 8500. Plates have been taken primarily in the summer months.

For the first 45 years or so, the collection was varied in field selection, exposure times, plate sensitivity and type, and development technique. After 1957, the coverage of fields became more systematic in field coverage, frequency of observation, plate type (almost all Kodak 103aO), and typical exposure time. As a result, plates dating from this time provide a much more uniform and complete observational data set.

Most of the exposure times range from 30 minutes to 1 hour. Plate limits in the most crowded of the Milky Way fields are about magnitude 15.5 in B. For the less crowded, higher latitude fields, the plates reach about 17th magnitude in good conditions.

3. Primary Fields Surveyed

Observations have been concentrated on four primary fields, mostly along the plane of the Milky Way. Three of these fields together cover approximately 90 degrees in Galactic longitude, making them ideally suited for studies of the statistics and properties of variable objects in the Galactic disk.

Table 1 gives the approximate range in coordinates and epochs covered by the four most frequently surveyed fields. The range in coordinates given for each

constellation in Table 1 indicates the edges of the areas surveyed and takes into account, in a very rough sense, the overlapping fields.

Table 1. Four primary fields covered by the MMO Plate Collection

<i>Field</i>	<i>Range in RA</i>	<i>Range in Dec</i>	<i>Beginning Epoch</i>	<i>Approx. No. Plates</i>
Scutum/Aquila	18 ^h 00 ^m to 19 ^h 45 ^m	-20° to +08°	1913	2000
Cygnus	19 ^h 15 ^m to 21 ^h 30 ^m	+24° to +50°	1913	2300
Sagittarius	17 ^h 30 ^m to 19 ^h 15 ^m	-34° to -12°	1957	1000
Coma Berenices	11 ^h 45 ^m to 13 ^h 30 ^m	+15° to +40°	1964	800

The remainder of the collection consists of exposures of asteroid fields from the earliest days of the collection (covering much of the sky, but in very short exposures), several high Galactic latitude fields added recently, plates of eclipses, the moon, comets, and a sampling of other objects of interest, such as the Andromeda Galaxy.

4. Where do we go from here?

With such a large number of plates sampling periods as long as 80 years in several regions, the MMO collection offers a special resource for variable star studies. We welcome other users. Unfortunately, we do not have the personnel currently to measure plates on request, but users may peruse the collection and make their own visual measurements. The Observatory facilities also include a measuring engine and a blink comparator.

In the future, we would like to make it relatively straightforward for an interested researcher to learn quickly whether the work they would like to do can be carried out using the MMO plates.

We are working to develop a database that will allow us to describe the spatial and temporal coverage of the collection, giving the frequency of plates available in any field over time, and an indication of where there are gaps in the time sequence. The database would also provide information on the quality and characteristics of the plates, and our eventual goal is to enable a user to specify coordinates and receive, by regular or electronic mail, a list of the plates and their properties that are available for that object. We are also investigating the feasibility of digitizing portions of the plates to permit the use of current photometric measurement and analysis techniques. We hope to acquire a digital camera, and make that, too, available to visitors for data acquisition.

We hope that with a plate collection that is easier to explore, access, and measure, this resource may be more widely used. We are open to suggestions for use of the collection, and welcome variable star researchers in making fuller use of the MMO plates.