

ARCHIVAL PHOTOGRAPHIC OBSERVATIONS IN THE PLEIADES FIELD: AN ON-LINE ACCESS TO THE PLEIADES PLATE DATABASE AND ANALYSIS OF THE ARCHIVAL PLATE DATA

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Abstract. Pleiades open cluster, favorite for astronomical observations, gives a rare challenge to obtain one of the longest photometric datasets. Photographic plates in the field are taken in about one century time period, from 1885 to 2000. Using the resources of the Wide-Field Plate Data Base (WFPDB), plate data and the astronomical plate archives information, we analyze the information for more than 3000 photographic plates with magnitude limit of 12th. Time distribution as well the magnitude limit of the plates in the observational period is presented. Pleiades Plate Database is organized and an on-line access, through the WFPDB web-page is provided.

1. INTRODUCTION

The Pleiades Plate Database (PPDB), (Tsvetkov et al. 2005) is a part of the Wide-Field Plate Database (WFPDB), <http://www.skyarchive.org>, (Tsvetkov et al. 2006) developed in the Institute of Astronomy, Bulgarian Academy of Sciences. The project aims at collecting information for photographic plates, taken with wide-field telescopes world-wide, as well as digitization of available plates. Using the resources of the WFPDB we found out more than 4000 Pleiades plates (Borisova et al. 2003), taken in about one century time period, from 1885 to 2000. The photographic observations in the Pleiades field give an unique opportunity to obtain one of the longest photometric datasets. The information in the database is updated by including information for Pleiades plates from telescope archives not yet available in the WFPDB, and by including digitized images of the plates. As far as we

aim at photometric research of the variable stars in the cluster, particularly flare stars, for publishing in the PPDB we have selected plates with reasonable magnitude limit 12^{th} to 20^{th} .

2. ON-LINE ACCESS TO THE PPDB

PPDB now includes information for 3088 direct photographic Pleiades plates, from 31 telescope archives, with magnitude limit fainter than 12^{th} . The online access to the PPDB is organized via the search page of the WFPDB at the address: http://www.skyarchive.org/search/index_pleiades.html. From this page searching into the selected plates is possible with different constrains: limiting magnitude, telescope identifier, observational time, exposure, spectral band, emulsion and filter, method of observation, etc. (Fig. 1).

The screenshot shows the WFPDB search page for the Pleiades cluster. The page is titled "Wide-Field Plate Database - Sofia Pleiades Search Page" and is displayed in a Mozilla Firefox browser window. The interface includes a navigation bar with links for WFPDB, VisiR, Aladin, Other Plate Catalogues, Access Log, and Readme. Below the navigation bar, there is a "Query Setup" section with options for "Maximum entries per page" (set to 10), "Output layout" (set to "html table"), and "Output Order" (set to "id + ct"). A "Magnitude" section has a "Magnitude Limit" input field. A "Constrains" section has an "Angular Distance from Plate Centre" input field. A "Display" section has a checkbox for "Display". Below these sections, there is a "Search by Constrains applied on Columns" table with columns for "Show", "Sort", "Column", "Constrains", "Units", and "Explain". The table lists various search criteria and their corresponding units and explanations. At the bottom of the table, there are "Submit" and "Reset All" buttons.

Show	Sort	Column	Constrains	Units	Explain
<input checked="" type="checkbox"/>	<input type="checkbox"/>	IDobj		(char)	WFPDB observer's identifier
<input checked="" type="checkbox"/>	<input type="checkbox"/>	IDinst		cm	Instrument aperture
<input checked="" type="checkbox"/>	<input type="checkbox"/>	IDinst1		(char)	Instrument aperture suffix
<input checked="" type="checkbox"/>	<input type="checkbox"/>	IDobj			Original plate number
<input checked="" type="checkbox"/>	<input type="checkbox"/>	IDinst2		(char)	Original plate number suffix
<input checked="" type="checkbox"/>	<input type="checkbox"/>	RAJ2000		hh mm	Right ascension
<input checked="" type="checkbox"/>	<input type="checkbox"/>	DECJ2000		dd mm	Declination
<input checked="" type="checkbox"/>	<input type="checkbox"/>	CCOD			Code for Error, Missing Data, or Uncertainty of coordinates
<input checked="" type="checkbox"/>	<input type="checkbox"/>	DATE UT		YYYY MM DD	Date of observation
<input checked="" type="checkbox"/>	<input type="checkbox"/>	ICOD			Code for Error, Missing Data, or Uncertainty of observation time
<input type="checkbox"/>	<input type="checkbox"/>	OBJNAM		(char)	Object or field designation
<input type="checkbox"/>	<input type="checkbox"/>	OBJTYP		(char)	Object type code
<input type="checkbox"/>	<input type="checkbox"/>	METHOD			Method of observation code
<input type="checkbox"/>	<input type="checkbox"/>	MULTEX			Multiplicity of exposure
<input type="checkbox"/>	<input type="checkbox"/>	EXP		min	Exposure time
<input type="checkbox"/>	<input type="checkbox"/>	EMULS		(char)	Emulsion type
<input type="checkbox"/>	<input type="checkbox"/>	FILT		(char)	Filter type
<input type="checkbox"/>	<input type="checkbox"/>	SPEC		(char)	Spectral band
<input type="checkbox"/>	<input type="checkbox"/>	DIMx			X dimension of plate
<input type="checkbox"/>	<input type="checkbox"/>	DIMy			Y dimension of plate
<input checked="" type="checkbox"/>	<input type="checkbox"/>	PQUAL			Link to quality information
<input checked="" type="checkbox"/>	<input type="checkbox"/>	PNOT			Link to note text
<input checked="" type="checkbox"/>	<input type="checkbox"/>	POBS			Link to observer's name(s)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	PAVA			Link to availability information
<input checked="" type="checkbox"/>	<input type="checkbox"/>	PDIG			Link to digitization information

Figure 1: The search page of the PPDB, as a part of WFPDB.

Detailed information for each plate and preview image for plate (if available) visualization can also be obtained (Fig. 2).

http://www.skyarchive.org - WIDE-FIELD PLATE DATABASE - Mozilla Firefox

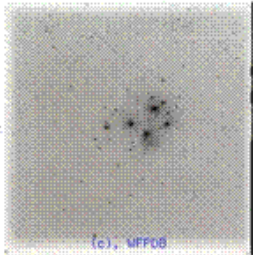
Wide-Field Plate Database - Sofia

[WFPDB](#) [WFPDB@VizieR](#) [Aldin](#) [Other Plate Catalogues](#) [Access Log](#) [Help](#)

Details for: **ROZ050 000081**

IDObs: ROZ	OBJNAM: PLEIADES
IDns: 50	OBJTYP:
IDref1:	METHOD: 2
IDnc: 000081	MULTEX: 6
IDref2:	EXP: 10.0
RAJ2000: 03 49 11	EMULS: ZU 21
DEC2000: 24 03 38	FILT: UG2
CCOD:	SPEC: B
DATE: 1979 12 09	DIMx: 13
UT: 17 46 00	DIMy: 13
TCOD:	

QUALITY:
NOTES:
OBSERVER: A.ISVETKOVA
AVAILABILITY:
DIGITIZATION:

PREVIEW:  SCAN: N/A
(c) WFPDB

[Close this page](#)

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Figure 2: Sample of PPDB search result for ROZ050 000081 plate with the plate preview image.

3. DATA DESCRIPTION AND ANALYSIS

At present the on-line version of the PPDB, includes plates from 31 telescope archives. Information for these plate archives can be found at <http://www.skyarchive.org/catalogue.html>. The time distribution of the plates (Fig. 3) shows that the period 1885-2000 could be covered almost homogeneously by

photometric observations, useful for periodicity analysis of relatively bright variable stars. Recently added to the Pleiades Plate Database are plates from the 34 cm Astrograph type telescope of Pulkovo Observatory, 19 cm Refractor type telescope of Maria Mitchell Observatory, 50 cm Schmidt telescope of Sonneberg Observatory, 53 cm and 100 cm Schmidt telescopes of Byurakan Observatory.

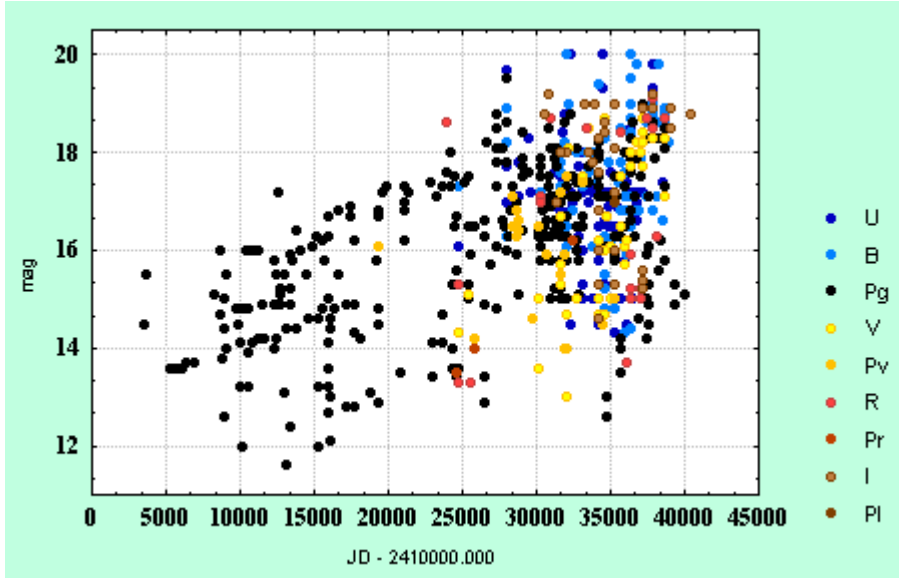


Figure 3: Time distribution of the photographic plates in the Pleiades field, taken with different telescopes.

Using the magnitude limit equation: $m_{\text{lim}} = C + 2.5 \lg F / \beta$, (C is a constant close to 20m, F is the focal length of the telescope in meters and β is the angular size of the image of a faint star), we calculated limiting magnitude for each plate. For the oldest plate archives such as Harvard and Maria Mitchell Observatory we used already published data for the plate limiting magnitude (Gorosabel and Castro-Tirado, 1998; Davis, 2004).

Magnitude limit for plates taken in differed spectral bands shows that all the observed time period can be fully covered by Pg plates (Fig. 4). It is also evident that multicolor UBVRI photometry for the Pleiades cluster is available in the period 1960 – 2000.

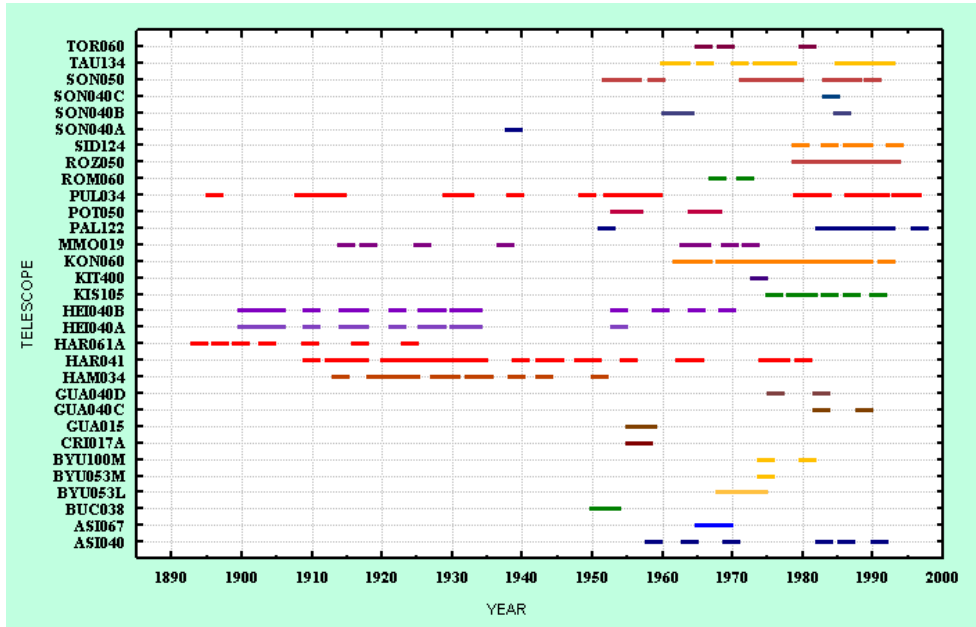


Figure 4: Magnitude limit for the photographic plates in the Pleiades field, taken in different spectral bands, versus observation time.

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