

Variability Study of GSC 5070:421

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Abstract

We searched for variable stars in archival data of the Catalina Sky Survey (CSS) by the blink-comparison method to compare images taken from difference times. We discovered a variability of star GSC 5070:421 at RA $17^{\text{h}} 17^{\text{m}} 06^{\text{s}}$, Dec $-02^{\circ} 28' 10''$, whose variability was previously undiscovered according to the SIMBAD. We constructed a light curve to observe the characteristic of this variable star. By comparing the light curve of GSC 5070:421 and that of the AAVSO database, we believed that GSC 5070:421 is a long period variable star type Omicron Ceti, which have period between 80 – 1,000 days.

Introduction

Variable stars are stars with varying brightness. Their brightness variability can be due to both internal and external causes, such as pulsation and flaring (internal) and eclipsing by a companion (external). Most stars in the sky do not exhibit observable variability. To find those few that do, one of the easiest methods to search for them is to compare images taken from different dates (i.e. several months apart) and look for stars with varying brightness. This technique is called blink comparison, which compares two images taken from different dates by quickly switching (“blink”) them back and forth. Most of stars will remains still while variable stars will stand out as blinking star. Moving objects such as minor planets can also be searched for using this method. We carry out this search by using imaging data from Catalina Sky Survey (CSS, <http://www.lpl.arizona.edu/css>) in Arizona (USA). The CSS is designed to search for Near Earth Asteroids (NEOs) and hence has large field of view suitable to search for variable stars.

Data Analysis

We obtained imaging data from Catalina Sky Survey’s data archive covering acquisition date of 2005 – 2006. These data were taken with the 0.76-meter f/1.9 Schmidt Telescope on Mt. Lemmon, Tucson, Arizona. CSS data normally reaches magnitude +19 and surveyed 800 square degrees of the sky during a typical night.

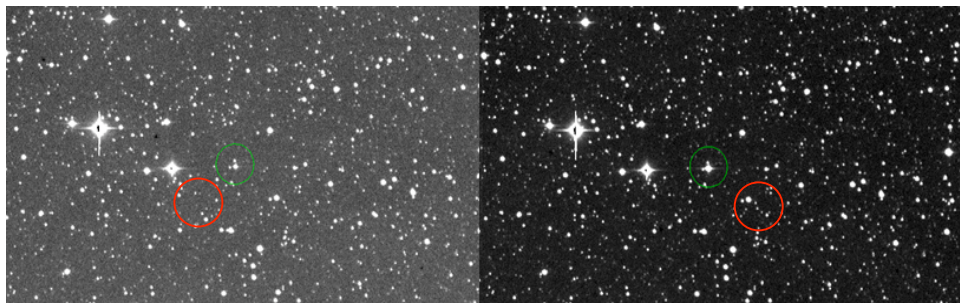


Fig. 1 Variability of GSC 5070:421

From the CSS archival data, we chose fields close to the galactic plane (near the Milky Way) for our variability search because more stars in the dense star fields of the Milky Way would yield greater probability of finding a new variable star. We then blink a large number of combinations of couple pictures at various time gap and area to search for variability. Different time gap is used because we do not know in advance what period of variability to expect. We discovered a variable star candidate (Fig. 1) and checked with SIMBAD (<http://cdsweb.u-strasbg.fr>) to see whether this variability has previously been reported. According to SIMBAD, no variability of GSC 5070:421 has previously been reported and hence it is likely a new variable star.

We do not presently have enough data to produce a complete light curve of GSC 5070:421, but from the data that we have so far indicates at least 580-day long period of variability (Fig. 2, top). According to the American Association of Variable Star Observers (AAVSO) light curve catalog (Fig. 2, bottom), we believe that this is a long period variable star of Omicron Cet type.

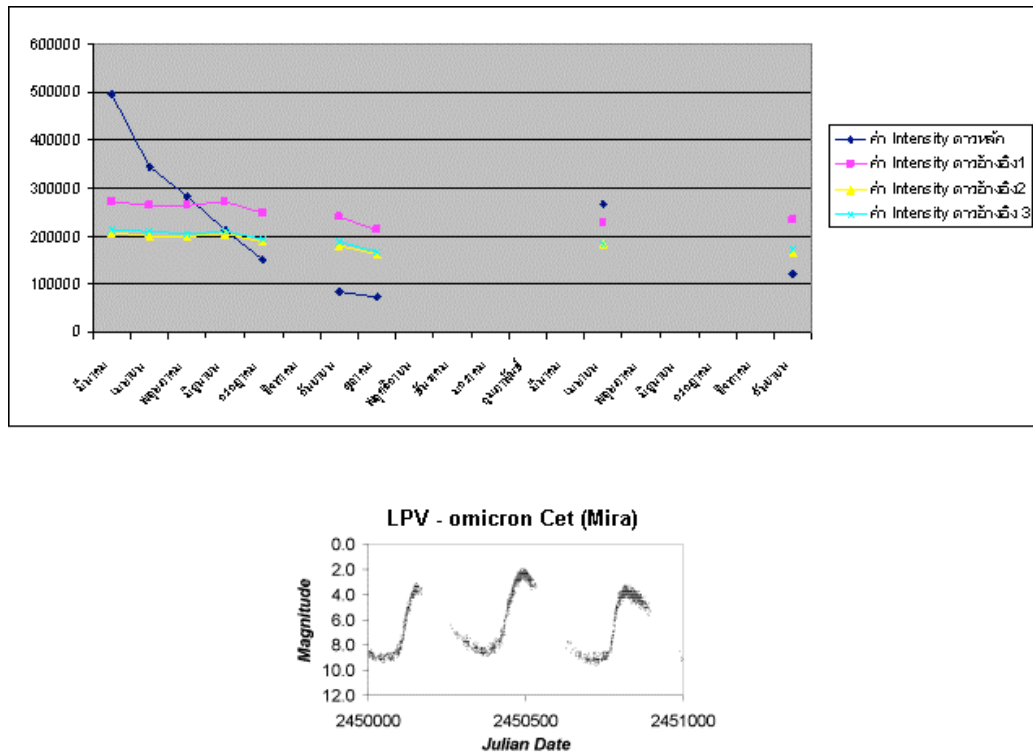


Fig. 2 Light curve of GSC 5070:421, along with three reference stars, compare with AAVSO light curve of Mira, an Omicron Cet variable star

Conclusion

We discovered a likely new long period variable star using archival data from the Catalina Sky Survey (CSS). The star, GSC 5070:421, has variability period of at least 580 days and likely to be a member of Omicron Cet type.