

**(20882) 2000 VH57:
AN INNER MAIN-BELT BINARY ASTEROID**

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(Received: 2019 Jan 15)

CCD photometric observations of the inner main-belt asteroid (20882) 2000 VH57 were made from 2018 Sept. 15 through Oct. 20. Analysis of the data showed that the asteroid is binary with a primary rotational period of 2.5586 hr and a satellite orbital period of 32.81 hr. Mutual eclipse/occultation events indicate a lower limit on the secondary-to-primary mean diameter ratio (D_s/D_p) of 0.23. During the period of observations, the primary and secondary lightcurves evolved as the viewing aspect changed. In particular, the depth of the secondary event increased significantly towards the end of the observations.

The minor planet (20882) 2000 VH57 is a member of the inner main-belt with an estimated diameter of 3.9 km. The asteroid lightcurve database (LCDB; Warner et al., 2009) had no previous rotational period when observations were started in 2018 September.

OBS	Telescope	Camera
CS3-PDS	0.30-m $f/9.6$ SCT	SBIG STL-1001E
TAR1-TO	0.46 $f/2.8$ reflector	SBIG STL-1001E

Table I. List of equipment at the two locations.

Observations were made on 23 nights at CS3-PDS between 2018 Sept. 15 and Oct. 20. Exposures were 240 sec, guided, and unfiltered. Observations at Teide Observatory (TAR1-TO, Tenerife, Spain) were made on Oct. 10 and 12. Exposures were 80 sec without a filter.

Number	Name	2018 mm/dd	Pts	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.
20882	2000 VH7	09/15–10/20	1504	19.30.7,2.1	21	0	2.5586 32.81	0.0001 0.02	0.16	0.02

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the dates of first, lowest, and last observations at 0:00 UT. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris et al., 1984). The first line gives the details for the primary body of the binary system. The second line gives the orbital period of the satellite.

All of the images were processed with master flat and dark frames prior to being measured with *MPO Canopus*. The Comp Star Selector utility in *MPO Canopus* was used to find near solar-color stars for ensemble differential photometry. The V magnitudes of the stars were taken from the APASS catalog (Henden et al., 2009).

The initial observations from CS3-PDS on Sept 15, 16, and 18 showed attenuations that suggested that the asteroid was binary. By Oct 9, the presence of a satellite was virtually assured but the orbital period was inconclusive since it was greater than 24 hours. This made finding the correct solution from a single station very difficult. Additional observations made at Teide Observatory (TO) proved to be essential for finding the orbital period.

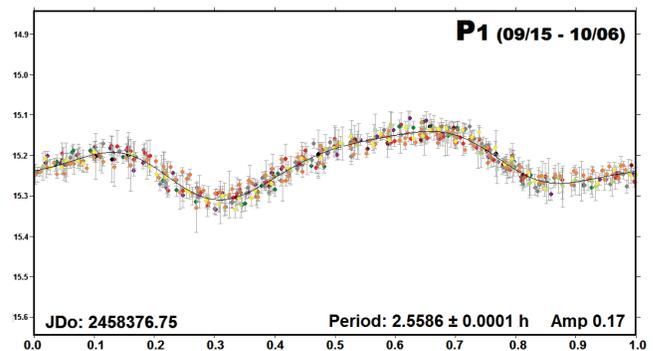
Lightcurve Evolution

Over the range of observations, the phase angle decreased from 19° to 2° , reaching a minimum of 0.5° on Oct. 17, a date for which there were no observations. As a result, the amplitude of the primary lightcurve, as expected (Zappala et al., 1990), became smaller. This complicated the lightcurve analysis somewhat but it was the secondary lightcurve that presented the greater challenge.

We analyzed the complete combined dataset of about 1500 observations and found that there were two significantly different solutions if the data set was split into two subsets, the first from Sept. 15 to Oct. 6 and the second from Oct. 8–20.

The lightcurves from each set are shown below. “P1” is the lightcurve for the primary while “P2” is the lightcurve showing the mutual events. The periods in the plots for the second set, Oct. 8–20, were forced to match those of the first set.

The mutual events evolved as the geometry between the Earth, the mutual orbit of the binary, and the Sun changed. This caused the secondary event, where the secondary is behind the primary, to deepen. Because of the evolving lightcurves, only a lower limit of $D_s/D_p = 0.23 \pm 0.02$ could be given for the secondary-to-primary effective diameters since the data did not establish that the event had become total.



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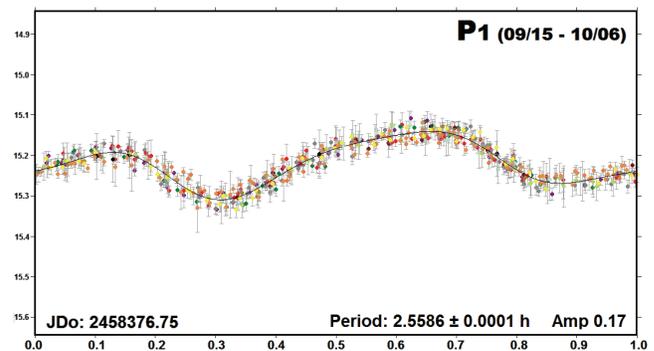
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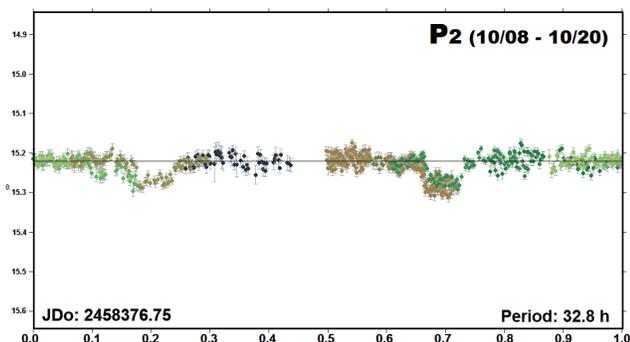
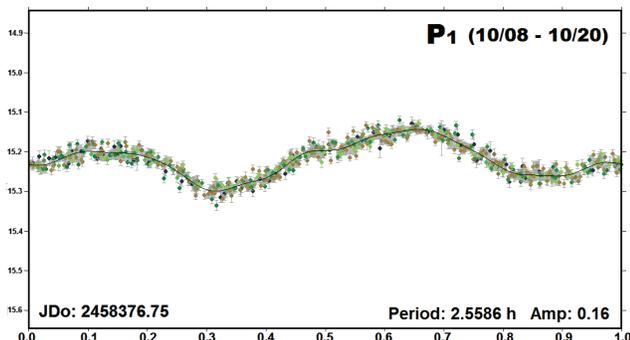
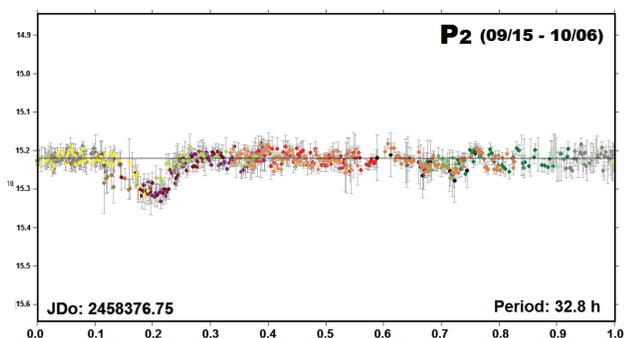
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References

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STAFF POSITION OPENING - ASSOCIATE PRODUCER, MINOR PLANET BULLETIN

The *Minor Planet Bulletin* announces the opening a new staff position of Associate Producer, with the probability of taking over the *MPB* Producer's position in about two years following a period of mentoring and collaboration. The responsibilities will be to assist the current Producer, Bob Werner, with the layout construction of each quarterly issue of the *Minor Planet Bulletin*, demonstrating proficiency for transitioning to the Producer position. For each *MPB* issue produced, the required tasks and capabilities to be demonstrated include:

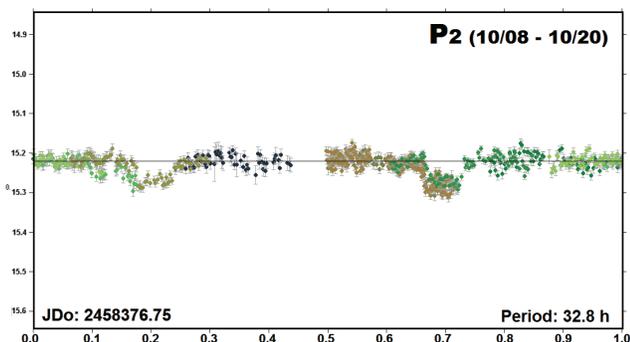
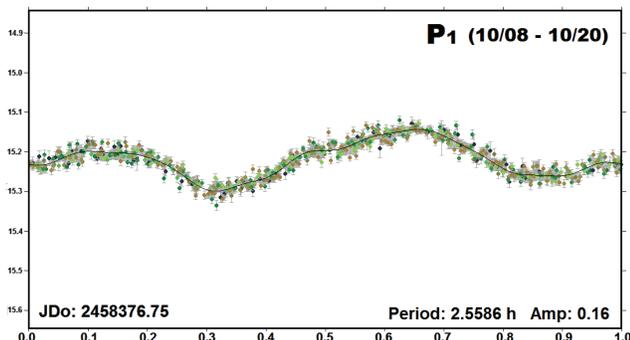
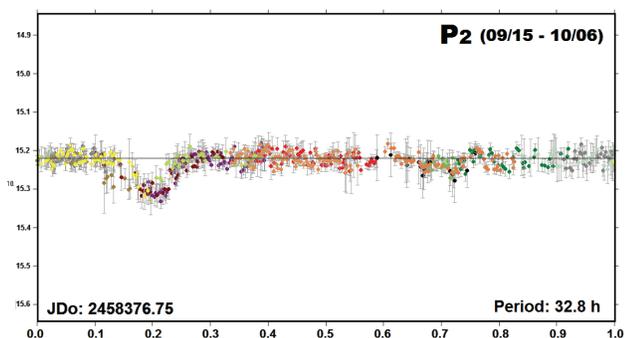
- Reformatting approximately 30–40 manuscript documents from the editors.
- Responsive communication with the editorial and distribution staff.
- Able to commit to and adhere to deadlines throughout the calendar year.
- Corresponding with authors via email with article proofs.
- Handling formatting inquiries from new and seasoned authors who contribute manuscripts to the *MPB*.
- Laying out an issue's articles in a single master document, resulting in the ready-to-print and ready-to-release electronic version of each *MPB* issue.
- Constructing a full index of each annual volume.
- Maintaining a long-term electronic archive of all issues.

The skills required for the position of Associate Producer, *Minor Planet Bulletin* include:

- Proficiency with Microsoft Word 2013/2010, Portable Document Format (pdf) computer documents, and email. Production status is tracked using Excel.
- Knowledgeable expertise with asteroid astronomy sufficient for some error checking and recommending editorial corrections.
- Strong skills with written English.

The time commitment required varies from issue to issue, but typically occupies 25 or 30 hours each quarter. The *Minor Planet Bulletin* publishes four issues per year. All *MPB* staff positions, including this announced opening for Associate Producer, are volunteer positions without pay or other compensation. Materials and postage costs, as necessary, are reimbursed.

Persons wishing to be considered for the Associate Producer position should send a statement of interest, a statement on the level of available commitment, and a summary of qualifications to the Editor: rpb@mit.edu Review of applications will begin February 1, 2019. The position will remain open until filled.



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