

AUTHORS GUIDE

The *Minor Planet Bulletin (MPB)* is open to papers on all aspects of minor planet study. Theoretical, observational, historical, review, and other topics from amateur and professional astronomers are welcome. The level of presentation should be such as to be readily understood by most amateur astronomers. The preferred language is English. All observational and theoretical papers will be reviewed by another researcher prior to publication to insure that results are presented clearly and concisely. Typically, papers will be published within three months of receipt. However, material submitted on or before the posted deadline may or may not appear in that issue, depending on available space and editorial processing.

There is no formal word or page count limit. Manuscripts should be as concise as possible but not to the point of sacrificing clarity or accuracy.

For lightcurve articles, authors are encouraged to combine as many objects together in a single article as possible. When presenting data on more than one asteroid, the asteroids should be listed in numerical order throughout, i.e., in the title, abstract, text body, and tables. Unnumbered asteroids should be listed after any numbered asteroids and by designation, which is – generally – the order of discovery. See recent *MPB* issues for examples.

The *MPB* will not generally publish articles on instrumentation. Persons interested in details of CCD instrumentation should consult web sites that provide both general information and specifics for given programs, such as:

American Association of Variable Star Observers (AAVSO).
An excellent CCD photometry handbook can be found on this site. <http://www.aavso.org>

International Occultation Timing Association (IOTA).
<http://www.lunar-occultations.com/iota/iotandx.htm>

Astrometry measurements should be submitted to the IAU Minor Planet Center <http://minorplanetcenter.org/iau/mpc.html> and are no longer being published or reproduced in the *MPB*.

Checking Previous Research

When reporting lightcurve results, authors should consult the Astrophysics Data System (ADS, http://adsabs.harvard.edu/abstract_service.html) and the Asteroid Lightcurve Database (LCDB; <http://www.minorplanet.info/lightcurvedatabase.html>) to look for previous results on each object. If using the LCDB, your reference to previous results should not be to the LCDB. Instead, your reference should be to the original author and publication where the currently accepted “best result” is reported, e.g. Lagerkvist (1978).

Claims of priority: “These are the first lightcurves reported for asteroid x.” is not an appropriate style for the *Minor Planet Bulletin*. Instead, something like: “A search of the Asteroid Lightcurve Database (or other resources) did not find any previously reported results for asteroid x.” is considered more acceptable.

If previous results have been reported and they are different from yours (beyond the error margins), try fitting your data to those other periods and report your “compare and contrast” results as part of the paper. This can be a brief statement, e.g., “The data

were checked against the period of 10.45 h found by Smith (2010) but this produced an unconvincing fit.”

Manuscript Submission

All material should be submitted electronically to the *Minor Planet Bulletin* editor, Professor Richard Binzel:

Dr. Richard Binzel
MIT 54-410
77 Massachusetts Ave.
Cambridge, MA 02139 USA
email: rpb@mit.edu

Manuscript Preparation

Authors are asked to carefully comply with the guidelines below in order to minimize the time required for editorial tasks.

We strongly encourage that all submissions be made electronically using MS Word or OpenOffice files (saved in MS Word format). If using Word 2007 or later, please save in DOCX instead of DOC format.

It is strongly requested that all manuscripts be prepared using the MS Word template found at:

<http://www.minorplanet.info/minorplanetbulletin.html>

Preferred Order

Most papers should follow this outline:

1. Title
2. Author list
3. Abstract
4. Body Text

Figures, e.g., lightcurves, can be embedded within the body so that they are close to the text that discusses them. See more under “Figures.”

The body text can contain a number of sections, as does this guide. Sections should be given a title using the Header 2 paragraph style.

Generally, keep the number of sections to a minimum. For example, it is not necessary, and even discouraged, to create an “Introduction” section that leads into an “Equipment” section followed by “Observations.” All of these, unless there is a very specific reason otherwise, should go into the body text without section headers.

5. Standard Table (see below).
6. Acknowledgements
7. References
8. Figures, if not embedded in the body text.

The abstract and body text should be written as if the other does not exist. Specifically, the first paragraph after the abstract should not be a continuation of the abstract. It may, and often does, sound redundant for the first paragraph to be a rephrasing of the abstract. Regardless, the two should be independent of one another.

Tables

The font size of a table’s contents should be large enough to allow for clear reproduction, usually no less than 6.5 points, preferably 8

Number	Name	2016 mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
1727	Mette	04/21-04/29	657	21.7,20.7	228	33	2.9812	0.0002	0.32	0.02	H
70030	Margaretmiller	05/09	245	24.3	268	-21	4.329	0.005	0.41	0.02	H

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris *et al.*, 1984). Grp is the asteroid family/group (Warner *et al.*, 2009).

Number	Name	2016 mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period	P.E.	Amp	A.E.	D	a/b	b/c
10306	Pagnol	07/16-08/01	163	5.9,5.6,7.7	298	11	4.79	0.01	0.27	0.05	9.1*	1.23	1.04

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle values are for the first and last date, unless a minimum (second value) was reached. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris *et al.*, 1984). Period is in hours. D is the estimated diameter (km). *diameter is from JPL Small Bodies Node. Other diameters were derived from *H* and *p_v* values. The last two columns give the a/b and b/c ratios based on the amplitude for an assumed triaxial ellipsoid viewed equatorially.

Number	Name	2016 mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
1863	Antinous	08/06-08/10	159	42.6,40.2	7	0	7.471	0.005	0.33	0.02	NEA
468448	2003 LS3	07/05-07/08	146	23.7,23.2	299	16	5.325	0.005	0.32	0.02	NEA
468448	2003 LS3	08/23-08/25	148	8.5,8.3	327	4	5.329	0.005	0.02	0.02	NEA
469513	2003 QR79	09/02-09/04	95	11.4,15.3	335	7	4.11	0.01	0.18	0.03	NEA

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle values are for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris *et al.*, 1984). Grp is the asteroid family/group (Warner *et al.*, 2009).

Number	Name	yyyy mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	U	Exp
52381	1993 HA	2015 12/08-12/09	305	47.2,47.4	81	-30	4.107	0.002	0.58	0.01	3	120
138847	2000 VE62	2016 03/11-05/09	277	53.6,56.0	238	10	6.469	0.002	0.36	0.02	3	60

Table I. Observing circumstances and results. The phase angle is given for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris *et al.*, 1984). The U rating is our estimate and not necessarily the one assigned in the asteroid lightcurve database (Warner *et al.*, 2009). Exp is average exposure, seconds.

points. Keep the number of columns to a minimum and try to avoid multi-line cells, except for headers.

Tables should be numbered consecutively in Roman numerals, i.e. I, II, III, etc. The caption goes below the table.

Place tables at the end of the text, after any figures. The layout editor will place them how and where appropriate. Generally, use only white backgrounds for tables.

Please do not embed tables as objects, e.g., as an Excel spreadsheet table. It is permissible to use a Word table created in the document (Insert | Table), but not one that is an embedded object from another document.

Wide Tables

Do not use section breaks in order to span a table across the page. In fact, do not use section breaks of any kind anywhere in the document.

If the table can fit into a single column, then you can place it inline with the text. If the table needs to span both columns, create a text box and insert a Word table within the text box.

The text box should be 7" wide and use top/bottom word wrapping. The internal margins of the box should be at 0.01-0.02" so that it's possible to click on the text box rather than the contents.

It is important to turn off the "Anchor to Text" (or "Move Object with Text") property of the text box in order to make it easier to change the layout of the paper as needed. Also, turn off "Allow overlap" and "Layout in table cell."

Standard Table for Observation Circumstances and Results

Any paper that reports on observations and results for lightcurve analysis needs to include a standardized table that contains a specific set of columns in specific order. This is to facilitate semi-automated data entry into large databases such as the asteroid lightcurve database (LCDB; Warner *et al.*, 2009).

Four examples of the standard table are shown above. These include the standard caption that goes below the table. The paragraph uses the "Caption" paragraph style. As shown in some of the examples, additional information can be included when necessary.

Other tables in the paper should not duplicate, if possible, the data in the standard table.

The standard table is not actually a MS Word table but text in a text box that follows the guidelines mentioned above, i.e., for a 7" wide text box. Usually the text box will be at the top of a page, so it should be positioned at 0" from the top and left margins. In this case, the top wrapping would be 0" and the bottom wrapping would be 0.05-0.1". If the table is at the bottom of a page, reverse the top/bottom wrapping numbers.

Keep in mind that your paper may not start at the top of an *MPB* page, so the layout may change during final production. This is why it is suggested that for tables with more than 2 or 3 lines be placed towards the end of a paper. If the table is only 1-2 lines, it can be fit at the bottom of the first page or top of the second page, if there is one.

The text in the table must use one of two paragraph styles: LCHheader and LCData. The Word template (v2.2 and higher) includes these paragraph styles. These styles contain pre-set tabs

that account for the standard columns. For this reason, use tabs and not spaces between the columns.

The standard columns are, in order

1. Number, blank entry if not numbered.
2. Name or designation if not named.
3. First and last dates in yyyy/mm/dd format.
4. Number of data points used for analysis.
5. Solar phase angle for the first and last date with a second, middle value if the phase angle reached a minimum during the date range. Values are given to 0.1° precision and assumed to be for 0h UT on the give date. Do not use ± to indicate after/before opposition.
6. Phase angle bisector (PAB) longitude and latitude for the approximate mid-date of the observations at 0h UT. Use integer values.
7. Rotation period, in hours
8. Error in rotation period, in hours. The precision should be the same as for the period.
9. Amplitude (peak-to-peak) of the lightcurve, in magnitudes to 0.01 mag precision, if appropriate.
10. Error in amplitude, in magnitudes to 0.01 mag precision, if appropriate. The precision should be the same as for the amplitude.
11. “Flex” column. The default is a short entry to indicate the group/family to which the asteroid belongs. If all the objects are the same group and this is mentioned in the text, the entry can be blank (but still put a tab after the amplitude error value). The column can also be used to show the exposure, filter, or other data.

If necessary, additional columns can be added to the end of the line but not before the first column or between the standard columns. If values are not available, *e.g.*, Points, enter a <tab>, leaving the column blank.

All data for each asteroid with the same observing circumstances must fit on a single line (see the sample tables for an example of a table with two entries for the same asteroid).

If necessary, you can reduce the font size from the default of 8 points, but do not go below 6.5 points, preferably 7 points.

If necessary, the actual tab settings can be altered to help accommodate the data but, again, the order of the columns must be correct, tabs must be used between columns, and the type of tab (left, right, decimal, centered) must be maintained.

To help with using the standard tables the first few times, copy/paste into your paper whichever of the four example tables above that most closely fits your needs and then substitute your data for those in the table.

The data lines do not all have to use the same tab settings. As shown in one of the examples, one data line has only one date. The tab setting was modified for that line only to center it in the column.

Captions of the standard tables cite Harris *et al.* (1984) and Warner *et al.* (2009). Remember to include the corresponding references in your paper. For your convenience, the two references are reproduced immediately below and can be copied into your paper:

Harris, A.W., Young, J.W., Scaltriti, F., Zappala, V. (1984). “Lightcurves and phase relations of the asteroids 82 Alkmene and 444 Gyptis.” *Icarus* **57**, 251-258.

Warner, B.D., Harris, A.W., Pravec, P. (2009). “The Asteroid Lightcurve Database.” *Icarus* **202**, 134-146. Updated 2016 Sep. <http://www.minorplanet.info/lightcurvedatabase.html>

N.B. The “Updated” date for the LCDB changes periodically. Be sure to indicate the year/month for the version that you referenced.

Figures

Figures, if captioned, should be numbered consecutively in Arabic numerals. You can insert figures within the body of the text or at the end.

If your paper reports on one or more asteroids, each with an extended discussion and figure(s), we recommend embedding the figure(s) in line with the text. Such figures may or may not be captioned (see comments below about figure captions).

If your paper reports on many asteroids with only one short paragraph and one or more figures for each, we recommend the first paragraph of each asteroid begin with the number and name/designation underlined and running on to the paragraph text. You might insert the asteroid’s figure(s) after its text, or alternately place all figures at the paper’s end.

It is preferred that you insert the graphics yourself, even if only at the end of the article, instead of supplying them as a set of files that must be inserted by the editors.

Please do not embed figures as objects, *e.g.*, Excel charts. If necessary, make a screen shot of the chart and edit it in a graphics editor. For example, in Windows, it is possible to highlight an Excel chart in Excel, copy it, and paste it into the Paint program.

If at all possible, use GIF or PNG format for all plots or charts to avoid “ringing” around small features that occurs when saving in JPG formation. BMP format files are much larger and can cause problems when several megabytes in size. The JPG format should be used if the figure is a gray-scale or color photo.

Use Insert | Picture | File on the Word main menu to insert graphics. If there are several consecutive figures, all but the last one should use the “Graphics” paragraph style. The last figure before any text, other than a caption, should use the “Normal” paragraph style. The picture wrapping style should be “In Line with Text.”

If inserting a figure that will span both columns, use a text box with appropriate wrapping to hold the figure. Do not use section breaks to change to a single column. It is very rare that a figure needs to be more than one column wide.

Figure captions should be used sparingly and offer new or expanded information. If, for example, a caption says only “Lightcurve for 1 Ceres phased to 9.078 h”, it is not needed since the standard table with circumstances and results (see above) will give the period and amplitude. You can also use text within the graphics to distinguish among them and reference the text in the body text instead of using a caption.

Use 300 dpi or higher resolution. Generally, use only white backgrounds for figures and solid colors for symbols. If the figure is in color, make it such that the grayscale rendering of the figure

is *easily* legible. For example, yellow symbols on a white background are *not* suitable. Labeling should be large enough to be easily readable when reproduced.

Avoid using color as the sole feature distinguishing data series in a figure. The black-and-white rendering of the archival printed copy of *MPB* might not show any differences.

Lightcurve plot symbols should be easily differentiated from one another. Each lightcurve should contain a legend that identifies each symbol with a date or other reference, the name of the object, the period (and error). If there is room, include the JD for zero phase or the first data point of a raw data plot, the period (and error) and amplitude (the error is not needed for the plot).

When adding a number of lightcurves at the end of a paper and to avoid a minimum of wasted white space, the original lightcurve figures should have an aspect ratio of about 1.45: 1 (width:height) and use the Graphics paragraph style. This allows putting 8 plots on a single page (4 per column).

To make the lightcurves as readable as possible, the legend and other information should be moved to inside the plot area. A tutorial on how this might be done is available at

<http://www.minorplanetobserver.com/MPOSoftware/MPBPlots.htm>

See recent *MPB* issues for examples of how the above guidelines were applied.

Equations and Special Symbols

If including equations with Greek characters or special symbols for any reason, please use only Times New Roman, Arial, or Symbol (Windows TrueType) fonts. Use the extended characters of these fonts to insert special characters such as eastern European diacritical characters. This is done on a Windows machine by ALT+XXXX, where XXXX is a four-digit code entered on the numeric keypad. The Character Map system utility can also be used to locate and copy the necessary character.

If special characters are used, then – in addition to your manuscript – please submit a PDF that *clearly* shows how those characters should appear.

Accepted Abbreviations and Other Conventions

The following abbreviations for units are preferred in the *MPB*:

arc minutes	arcmin
arc seconds	arcsec
days	d
degrees	° (Alt+0176, see notes under “Equations and Special Symbols”), or deg
hours	h
magnitudes	mag
meters	m
minutes	min
pixel	pix
plus/minus	± (Alt+0177, see notes under “Equations and Special Symbols”)
seconds	s

A space should separate a value and unit, e.g., 7.1334 h. An exception to this is when the unit is used as part of a description, e.g., 0.4-m telescope, 14-inch SCT, or 30-s exposures.

If the unit falls onto the next line by itself, you can add a new line (Shift+Enter in Word) just before the first character of the value. This will keep the value and unit together.

If including a value and error, include the units only once, after the error, e.g., 7.144 ± 0.005 h.

“lightcurve” is a single word.

Use a leading zero for a number whose absolute value is less than 1, e.g. 0.35 or –0.15.

When referring to a numbered asteroid that is named, do not put the number in parentheses, e.g., 1 Ceres instead of (1) Ceres.

When the asteroid is numbered but has only its MPC designation, put the number in parentheses, e.g., (178956) 2001 QN185. Note that the number in the designation is not subscripted. Do not use parentheses around the number if the number is a separate column in a table. See “Standard Table for Observation Circumstances and Results” and the sample tables above.

Dates

In order to standardize dates and avoid confusion due to different formats, we prefer that ANSI date format be used, i.e., year-month-day, e.g., 2010 Nov 12 or 2010 November 12.

It is strongly recommended that all numeric dates not be used, e.g., 2012-09-07, since it is not clear if the writer used the ANSI date format or not (see exception for tables below).

When using a month name and date, do not include a leading zero for a date from 1 to 9. For example, write Nov 7 instead of Nov 07.

If using only the three-letter abbreviation for the month, it is not necessary to include the period after, i.e., instead of “Nov.” use “Nov”.

If using only the month and year, put the year before the month, i.e., 2008 Nov or 2008 November.

In a table, such as giving a range of dates for observations, numbers can be used to save space. The column head (or table caption) should clearly indicate the format, e.g., “mm/dd”. Unless the year changes, include only the month and day in the table entries but indicate the year in the column header (or table caption).

References

Authors should try to follow the standard reference styles for the *Minor Planet Bulletin*. It can be tedious for an editor to fix out-of-standard references.

References should be cited in the text such as Harris and Young (1980) for one or two authors or Bowell *et al.* (1979) for more than two authors. If the author and year are within the parentheses, separate the author and year with a comma. If multiple references are given within parentheses, separate the references with a semicolon. For example: “The results are in good agreement with earlier works (Smith, 1999; Jones, 2010).”

URLs (web addresses) should be italics, whether in the article body or in a reference. If a URL is too long for one line, separate after a slash or hyphen, or before a period.

Please remove active hyperlinks from the document (usually indicated by the text being in blue or the default hyperlink text color). These do not always convert to valid hyperlinks when producing the final PDF document.

The reference section should list papers in alphabetical order of the first author's last name, then by year. Include the full list of authors in the citation in the References section, unless it exceeds 15. In that case, use "and xxx colleagues" (without the quotes) as the "last author" where xxx is the number of unlisted authors. Use surname, initials for each author, separating author names with commas (e.g., Astronomer, J.Q., Assistant, H.I.S.).

There are no blanks between initials.

For references by multiple authors, omit the word "and" before the final author, unless it is the "and xxx colleagues" case described above.

Include the full title of the work in addition to the publication, volume, and page numbers. Include *both* beginning and ending page number for articles spanning more than one page. Many journals now give an article number instead of page range. In this case, use AXX where XX is the article number. It is not necessary to include the number of pages after the article number.

If several references are to the same web site and differ only in year, use a single reference with the several years instead of a separate reference for each year. For example,

Behred, R. (2002, 2005, 2006). Observatoire de Geneve web site.
http://obswww.unige.ch/~behrend/page_cou.html

It is acceptable to start a URL on a line by itself, e.g.

JPL (2016). Small Body Database Search Engine.
http://ssd.jpl.nasa.gov/sbdb_query.cgi

The line preceding a URL can be left-justified by ending it with a tab, if needed, and newline (Shift+Enter in Word).

Here are example entries for a journal article with page numbers, a journal article with article number, a chapter in a book, and a book.

Bus, S.J., Binzel, R.P. (2002a). "Phase II of the Small Main-Belt Asteroid Spectroscopic Survey. The Observations." *Icarus* **158**, 106-145.

Jacobson, S.A., Scheeres, D.J., McMahon, J. (2014). "Formation of the Wide Asynchronous Binary Asteroid Population." *Ap. J.* **780**, A60.

Pravec, P., Harris, A.W., Michalowski, T. (2002). "Asteroid Rotations." In *Asteroids III* (W.F. Bottke, A. Cellino, P. Paolicchi, R.P. Binzel, eds.) pp 113-122. Univ. Arizona Press, Tucson.

Warner, B.D. (2006). *A Practical Guide to Lightcurve Photometry and Analysis* (2nd edition). pp 268. Springer, New York.