

# Authors

## Writing for WGN

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Advice to authors writing for WGN is presented. Comments on writing scientific papers are provided, especially on References, where mistakes are easily made. Information of the correct use of SI units is provided. The preferred L<sup>A</sup>T<sub>E</sub>X format is briefly introduced, with information for authors who use this. It is emphasized that L<sup>A</sup>T<sub>E</sub>X is not essential. Alternative information is given for those who use other formats such as Word.

### 1 Introduction

Any Journal depends on its authors, and we encourage you to write up your ideas and results for WGN.

One of the strengths of the IMO is that it includes people from many professions, not just those with a scientific training. Those inexperienced in writing scientific papers may appreciate help, so guidance is given below. This article has been written in the layout of a scientific paper, for illustration.

WGN is produced in a computer format called L<sup>A</sup>T<sub>E</sub>X, and those who know this will need a little information to write their papers close to the final format. Those who do not know L<sup>A</sup>T<sub>E</sub>X need not worry, as WGN accepts papers in other forms.

### 2 Writing scientific papers

There are certain conventions in writing scientific papers, i.e. articles, to make them easy to read. One is the way a Paper is divided into sections.

#### 2.1 The sections of a Paper

There are usually six main sections.

1. **Title and Author.** There is nothing special about these, but please remember to provide an address where interested readers can contact you. It is helpful to provide an email address too.
2. **Abstract.** This should describe, very briefly, what the paper is about. It is there for readers who are not sure whether the paper is what they want. It should make it possible for them to decide without reading through the paper.

Some people advise the following: The first one or two sentences should expand the title and say why the work was performed. The Abstract should say what was done and what it contributes to science. The length should be between two or three sentences and a quarter of a page for a long paper.

It should be possible to understand an Abstract by itself, so it is bad practice to include citations (see References below).

3. **Introduction.** This should 'get the reader up to speed' on your subject. Remember that the

reader may not be a specialist in your part of meteor studies, so some background may help. If your paper describes an algorithm to distinguish meteors from aircraft, for instance, your Introduction should probably say that this is a computer program which examines images from a TV camera. Many readers will be visual observers and will not understand unless you say this.

4. **Detailed sections.** These are the heart of your paper. Their number, names and contents depend on your material. Here you will have least difficulty in deciding how to organize your writing.
5. **Conclusion.** This should remind the reader of what they have learned from the paper. It should draw all the material together and point out the most important results. It may point out shortcomings and future lines of research; other than this, it should not introduce new information.

Without a Conclusion a paper stops suddenly, as if a radio's batteries had failed during a programme.

6. **References.** These are material (papers, books, etc.) which you have read and which you have referred to in your paper. A later section of this article looks at them in detail.

You may sometimes need to vary this pattern. You may wish to add an Acknowledgments section after the Conclusion. Details which are not essential to the reader's understanding should be put in an Appendix at the end and just summarized in the detailed sections. Occasionally there will be no References, for example in a social report of an International Meteor Conference.

You may want to divide some sections into subsections. These can be arranged as you wish.

#### 2.2 Other aspects of style

There are many recommendations for good writing, including:

**Keep it simple.** Complicated sentences are hard to understand. A straightforward way of saying things is normally best. This is especially true for an international Journal like WGN, where few readers grew up

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speaking English. If a sentence is too complicated, it is better to split it into two separate sentences.

**Keep it formal.** Good scientific writing is calm rather than excited, formal rather than slang. Prefer ‘it is’ to ‘it’s’, ‘do not’ to ‘don’t’, and ‘the results were unexpected’ to ‘what we’d eyeballed was, wow, kinda wild’.

Similarly, avoid exaggerations and extreme descriptions. ‘The fireball was enormous, absolutely gigantic’ sounds like something from a children’s magazine; it does not make you sound like a careful researcher. Exclamation marks (!) are normally a mistake.

It is sometimes thought that a Possessive (i.e. Genitive) with an inverted comma, such as ‘meteor’s’, is bad style. This is not true. ‘The Perseid shower’s maximum’ is just as good as ‘the maximum of the shower of the Perseids’, and shorter.

**Do not use ten words when five will do.** The fewer words you use, the less time readers need to understand your ideas. Even experienced writers can improve. For instance, a first attempt at this article included

*Without a Conclusion, a piece of writing seems to stop suddenly — it is a bit as if a radio’s batteries have failed suddenly in the middle of a programme.*

This was changed to

*Without a Conclusion a paper stops suddenly, as if a radio’s batteries had failed during a programme.*

Is the meaning different? Has anything been lost? Most people would answer ‘No’.

**Avoiding the First Person.** Traditionally, the First Person Singular (I) and the First Person Plural (we) are avoided in scientific papers. The idea is that you are reporting on your research, not on yourself.

This convention is slowly changing, and WGN leaves the decision to the Authors. However, we suggest that avoiding the first person (saying ‘the results were remarkable’ and not ‘we thought that the results were remarkable’) concentrates the reader’s attention on your science.

**Keep to one tense, normally the Past.** It is often hard to decide whether to write in the Past or Present tense. Mixing them makes it hard for the reader — they feel they are jumping between two stories, one written now and one in the past. Scientific papers are normally written in the past tense, since the work was done in the past: ‘the Perseids were observed’, ‘analysis showed that’. However, some statements make more sense in the present tense: ‘there is evidence’, ‘the shower is evolving’.

**Understand your readership.** Do you start by writing a basic textbook on meteors, or do you assume your readers are experts in your speciality? For WGN, you should assume that

- Your readers have a general knowledge of meteor science. You need not explain meteor showers, ZHR or  $r$ -value, for instance.
- They **may** know your specialized field within meteoritics, for instance telescopic meteors, history,

video observations or the mathematics of meteoroid orbits. The Abstract and Introduction should say enough for them to see whether this is a speciality they understand. Sometimes it is possible for the Introduction to give a brief comment and reference(s) for people who are new to your speciality. It is impractical to do more: for the rest of your paper, you may assume your readers know your sub-field of meteor studies.

**Define mathematical symbols.** Some symbols are standard in all physical sciences (e.g.  $\pi$  and  $G$ ) or in meteor science (e.g. ZHR and  $r$ ). All others should be defined where they first occur, e.g. ‘the number of electrons  $n_e$  in a CCD pixel is  $n_e = n_\phi Q_E$ , where  $n_\phi$  is the number of photons hitting it and  $Q_E$  is ...’.

**Get a friend to read it.** By the time you have finished your research, you are so close to it that you forget how much more you know than others. Similarly, when writing your paper you are so close to it that you do not see what is too short, too long, too simple or too complicated.

A good solution is to get someone else to read your paper. There are three requirements: (1) they know meteor science; (2) they have not been involved in your research, so they see it with fresh eyes; (3) they understand that criticisms are helpful to you, not an insult.

### 3 Writing in English

Few of WGN’s contributors are native English speakers. Others may worry about their ability to write good English. There is no space here to teach a language, but a few hints can be given. A good dictionary is an important tool. Spellcheckers are useful, though they miss many mistakes. If you use Linux, the ISPELL spellchecker is available; typing `man ispell` will show whether it is installed.

The Oxford University Press publish a wide range of dictionaries and other language books, including Fowler’s Modern English Usage (Burchfield, 1998), a standard work. They provide some free on-line advice at [www.askoxford.com](http://www.askoxford.com).

Do not let worries about your English prevent you writing for WGN — your submission will be edited by someone who knows English well. This provides you with a safety-net to ensure that your ideas are presented in language that does you credit.

### 4 Tables, figures and equations

Remember to provide a caption for every figure and table. They should enable the reader to understand the illustration without reading the rest of the text. Captions like ‘See text for explanation.’ are unhelpful.

All tables, figures and equations should be numbered. They should each have their own numbering scheme, so there will be a Table 1, a Figure 1 and an Equation 1. All tables and figures should be referred to in the text, for instance ‘the apparatus (Figure 4) produced the measurements shown in Table 7’.

Equations are numbered in brackets at the right-

hand margin:

$$e = mc^2 \quad (1)$$

Tables can be typed into your document where you want them to appear. Figures should not be included in the text, however. If your submission is a computer document (which is preferred), please supply separate files. Postscript images (extension `.ps` or `.eps`) are preferred, but we can handle other forms, for instance BMP, GIF and TIFF and FITS. If you supply paper, send each figure on a separate sheet; remember to label it in a corner or in pencil on the back, stating author, brief paper title and figure number.

It is convenient if you type the caption at the point where you want the figure to appear. If you are providing the figure as a computer file, add a note of the filename next to the caption. Remember, though, that editors often move figures and tables to make them fit on the page.

## 5 WGN conventions

What has been said is true for most scientific Journals. Like many Journals, WGN has its own House Style. A brief guide to these follows. For those who know  $\text{\LaTeX}$ , comments on writing in this format are added. If you are uncertain about any of this, do not worry — we will format your paper correctly.

### 5.1 Units

With a few exceptions, WGN uses SI units, not mks or cgs. Thus energy is in joules not ergs, and power is in watts not ergs per second or joules per second.

The exceptions are those commonly used for good reason by astronomy and meteor science such as years, AU or earth masses.

The SI standard includes conventions as to whether letters should be upright (also called Roman) or italic.

- Numbers are always upright, e.g. 3.142.
- Units of measurement are upright e.g. km/s, W, m/s<sup>2</sup>.
- Names of variables are in italics, e.g.  $T$ ,  $t$ ,  $v$ ,  $\theta$ . There are exceptions to this: see below.
- Names of physical constants are in italics, e.g.  $c$ ,  $G$ .
- Names of mathematical constants such as  $\pi$  and  $e$  are upright.

There are two exceptions where a variable name is in upright type, not italic. One is where the name (ignoring subscripts) has more than one letter, e.g. ZHR, LM. The other is where the name does not take numerical values but identifies an object; this mainly occurs in subscripts. For instance  $h_{\mathbf{R}}$  is the angular height of the radiant, and the  $\mathbf{R}$  states that it is a radiant whose height is being described. Note that the  $h$  is italic since this names a numeric variable. Sometimes the subscript identifies one of a set, for instance  $n_{\text{LEO}}$ ,  $n_{\text{GEM}}$  or  $n_{\text{PER}}$  for the numbers of meteors from the named showers.

Compare this with  $v_t$ , the speed at time  $t$ , where the subscript is a numeric variable and thus italic. The Editor will deal with difficult cases; at least one official specification document is ambiguous.

Units should follow the quantity after a space, e.g.  $t = 3 \text{ s}$ ,  $v = 5 \text{ m/s}$ . There are exceptions to this, the main ones being degrees of angle (e.g.  $90^\circ$ ) and temperature (e.g.  $10^\circ\text{C}$  or  $283\text{K}$ ). Note that absolute temperature has no degrees sign before the K.

Units in the denominator can be written with a solidus (/) or a negative exponent, e.g. m/s or  $\text{m s}^{-1}$ . The latter is preferred for complicated forms.

Multipliers such as milli and micro are placed next to the units, e.g. 15 mm, 10  $\mu\text{s}$ .

Comments follow on two particular cases.

### 5.2 Date and time

WGN prints this in scientific format, which moves monotonically from most significant ‘digit’ (year) to least significant ‘digit’ (seconds). For example: 2003 December 25, 01<sup>h</sup>23<sup>m</sup>45<sup>s</sup> UT, or some subset of this. Day of the week should be omitted unless there is a good reason for it.

Note (1) the month in words, to remove ambiguity; (2) the comma between days and hours, for clarity; (3) the use of superscripted **h**, **m** and **s** as units and separators; (4) the leading zero, always using two digits; and (5) the specification of the time zone, UT or local. If local time is used, make sure it is clear which time zone this is.

This format may be ignored for non-scientific purposes: ‘we arrived just after mid-day on Sunday’ is perfectly acceptable, for instance.

### 5.3 Astronomical magnitudes

The astronomical magnitude is not an SI unit. It is also a logarithmic measure of brightness, so it has no units. Thus a statement like ‘the meteor reached 3 magnitudes’ is wrong; ‘the meteor reached magnitude 3’ is correct. One can also write ‘the meteor reached  $m = 3$ ’.

There are two symbols for magnitude:  $m$  for apparent magnitude, which is the one normally used; and  $M$  for absolute magnitude, which is what the meteor’s apparent magnitude would be if it were 100 km directly above the observer. Both these can be subscripted to specify the wavelengths used, for instance  $m_V$  or  $M_V$  for visible light magnitudes. Most meteor work is at visible wavelengths, however, so this is rarely necessary.

Remember that magnitude ‘counts backwards’. Phrases like ‘the faintest meteors (less than magnitude 5)’ are unclear — did the writer mean magnitudes such as 6 or such as 4? It can be better to say ‘brighter than’ or ‘fainter than’.

### 5.4 Writing these formats into your paper

Italics, subscripts and superscripts are easy with word-processors such as Word; so are Greek letters. More obscure symbols, such as  $\lambda_{\odot}$  for solar longitude, are probably best put in words, e.g. ‘[solar longitude]’, leaving it to the Editor to typeset them properly. A covering note with the submitted paper can explain, if needed.

If you use a WYSIWYG word processor other than Word or Word Perfect, please export the file as ASCII (otherwise known as text or MSDOS text). This process can lose information, so if possible supply a form such as Adobe Acrobat (i.e. PDF) or Postscript. (The author recently edited a paper where all Greek letters had been exported as asterisks. ‘\* Lyrae’ could have been  $\alpha$  Lyrae,  $\beta$  Lyrae,  $\gamma$  Lyrae, ...)

There are  $\LaTeX$  commands created by WGN; for instance, `\g` gives a degrees symbol. The following list will mainly be of interest to those who write in  $\LaTeX$ .

Table 1 – Special  $\LaTeX$  commands defined for WGN.

Use	$\LaTeX$	Result
Angle	<code>\g \mi \se</code>	12°34'56''
Decimal degrees	<code>\dg</code>	12°34
Decimal arcminutes	<code>\dmi</code>	12'34
Time	<code>\h \m \s</code>	12 <sup>h</sup> 34 <sup>m</sup> 56 <sup>s</sup>
Decimal hours *	<code>\dhr</code>	12 <sup>h</sup> 34
Decimal minutes	<code>\dm</code>	12 <sup>m</sup> 34
V-infinity	<code>\vi</code>	$V_{\infty} = 72 \text{ km/s}$
Solar longitude	<code>\sol</code>	$\lambda_{\odot} = 123^{\circ}$

\* The command `\dh` already exists in  $\LaTeX$ , so `\dhr` is used instead.

All the commands in Table 1 should be used in maths mode, for instance `$12\g34\mi56\se$` to produce the top-right entry.

These  $\LaTeX$  commands are defined specially for WGN, and so are not part of any normal  $\LaTeX$  distribution. They are contained in a file `wgn2.sty`. If you want this, send an email to the Editor at `wgn@imo.net` and ask for a copy. At some point in the future it will probably be put on the IMO website.

To use this file, you must place it in the same subdirectory as your paper and add a line `\usepackage{wgn2}` between your `\documentclass` and `\begin{document}` statements.

## 6 References

This is the section where you refer to work you have read and which is relevant to the paper you are writing. It can help readers to

- Read background which they do not know.
- Check that they agree with your interpretation of other peoples' work.
- Read further, when your paper shows them interesting lines of research.

Just as important, references make it clear that you know when someone else discovered or invented something. There is a convention in scientific papers: if you do not mention the originator of an idea, readers assume you are claiming it as your own discovery.

### 6.1 Citations and References

There are many ways of writing references. The layout used in science and engineering involves a marker called a **citation** in the text and the full details, called

the **reference**, at the end. For instance, I might say that standard reference works (Burchfield, 1998) can help in writing good English. The ‘(Burchfield, 1998)’ is the citation. If you look at the end of this article you will find a section called References. If you look at the author and date matching the citation, you will find full details of the book described. These details are called the Reference; they should be all you need to find the book or article.

Readers get to the references from the citations, so there should be no references without a citation.

### 6.2 Format of citations and references

There are several formats used in scientific writing. Citations such as (Bloggs, 1999), [Blo99], [42] and many others will be encountered.

To avoid mistakes, please do not use the numerical reference system with citations like [42].

The system used in WGN has **Citations** comprising the name(s) of the author(s) and the year of publication, e.g. (Copernicus, 1543). Two authors are given as (Starsky & Hutch, 1979); three or more as (Kool et al., 2002), naming just the first author. (‘Et al.’ is Latin for ‘and others’.) If you use more than one work by the same author(s) from the same year, use (Bloggs, 2000a), (Bloggs, 2000b) and so on. Multiple citations can be combined as (Dent, 1999; Prefect, 2002a, 2010). If what you read gave no author, use ‘Anon.’; if no date, use ‘No date’.

For WGN, **References** should be in alphabetical order of author(s), and within that in order of publication year.

The authors' initials should follow the surname. Where there are three or more authors, all are listed; ‘et al.’ is only used in the citation. Use ‘and’ between the last two names; ‘&’ is only for the citation. The References at the end of this article show the format.

Different types of writing require different details for the References, as shown in Table 2. Please provide these in the order shown. Do not add any formatting such as bold face or quotation marks; we will add that in the WGN house style.

## 7 Writing for WGN in $\LaTeX$

Here is not the place to debate the relative advantages of WYSIWYG systems such as Microsoft Word and mark-up languages such as  $\LaTeX$ . It is clear, however, that  $\LaTeX$  has become the accepted standard for much scientific and engineering publication. WGN previously used  $\TeX$ , but has now changed to  $\LaTeX$ .

Many WGN readers will already know  $\LaTeX$ . For those who do not, (Lamport, 1986) and (Goossens et al, 1994) are the standard books on the subject; (Kopka & Daly, 1999) seems very clearly written and is probably a good start for beginners. Only a few guidelines will be given here.

- Only  $\LaTeX 2_{\epsilon}$  is used, not the older  $\LaTeX 2.09$ .
- The paper size is A4 and the document style is article.

Table 2 – Information required for References in WGN.

	Author(s)	Year	Paper title	Journal details	Book details	Conference details	Pages	URL
Journal paper	✓	✓	✓	✓[1]			✓	
Book	✓	✓			✓[2]		[3]	
Book chapter	✓	✓	✓		✓[2]		✓	
Conference paper	✓	✓	✓			✓[4]	✓	
Entire conference proceedings	✓	✓				✓[4]		
World-wide web page [5]	✓	✓	✓					✓

## Notes

1. Journal details should include (in order): Journal name, Volume, and Issue (if known). If neither Volume nor Issue is available, month and possibly day of publication should be added.
2. Book details should include (in order): Book title, Publisher, Publisher’s town and country. If the town is well known (e.g. Oxford, New York), the country may be omitted.
3. If referring to just part of a book, page numbers are helpful.
4. The Conference Details should include (in order): Conference name, Place of the conference, Conference dates and Proceedings publisher (if known). Conference dates may differ from the date of publication.
5. Web pages are impermanent, and thus are not good references.

- The start-of-document command should be `\documentclass[10pt,a4paper,twoside,dvips]{article}`. Writers in North America may prefer to omit `a4paper` for their own proof prints.
- It will be impractical for you to produce WGN’s two-column layout. Use the `article` style as if you were writing for a single-column journal.

More detailed information may be given later when WGN’s  $\LaTeX$  mechanisms have developed more and stabilized. Those who use  $\text{BIB}\TeX$  may send a `.bib` file; contact the Editor if uncertain how to do this.

If you find it hard to produce what you want in  $\LaTeX$ , don’t worry — see the next section.

## 8 $\LaTeX$ is not necessary

It is easier for us if you offer your paper in  $\LaTeX$ , but not essential. We would far rather receive your paper in any form than miss it. If possible, send a machine-readable form — we prefer not to have to type it in.

We will format your paper to fit WGN, and probably adjust the positions of figures and tables. It is not worth your while spending time on the exact layout.

## 9 Main things to remember

If this seem horribly complicated, remember the advice on the cover of the Hitchhikers’ Guide to the Galaxy — Don’t Panic! When you submit your paper you are sending it to intelligent humans, not a simple-minded machine. If we can work out what you want, we can format it.  $\LaTeX$  reduces our work but is not essential.

We may want to contact you about your paper. Please give us an email address where we can contact you in the period between submission and publication.

If you are uncertain whether your work is right for WGN, submit it anyway. We will tell you honestly if it needs improvement, and give you guidance about improving it. Astronomy only advances because people conduct research and then write it up.

## 10 Conclusion

WGN welcomes submitted papers. The accepted format of a scientific paper has been outlined. With minor exceptions, all submissions should be in this format, which is designed to help readers. This article has been formatted like a scientific paper, for illustration.

Details have also been given of the correct SI format for writing quantities and units.

Papers are prepared for publication in  $\LaTeX$ , and authors are encouraged to write in this form. Papers in other formats (e.g. Word) are accepted and will be re-formatted.

Above all, readers are encouraged to share the results of their research by writing for WGN. Help to authors will be given where necessary.

## References

- Burchfield R. (1998) “New Fowler’s Modern English Usage (3rd, Ed.)”, Oxford University Press, Oxford.
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- Kopka H. and Daly P.W. (1999) “A Guide to  $\LaTeX$ , 3rd.ed.”, Addison-Wesley, London.
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