

# Scientific Writing and Publishing Papers for Planetary Sciences

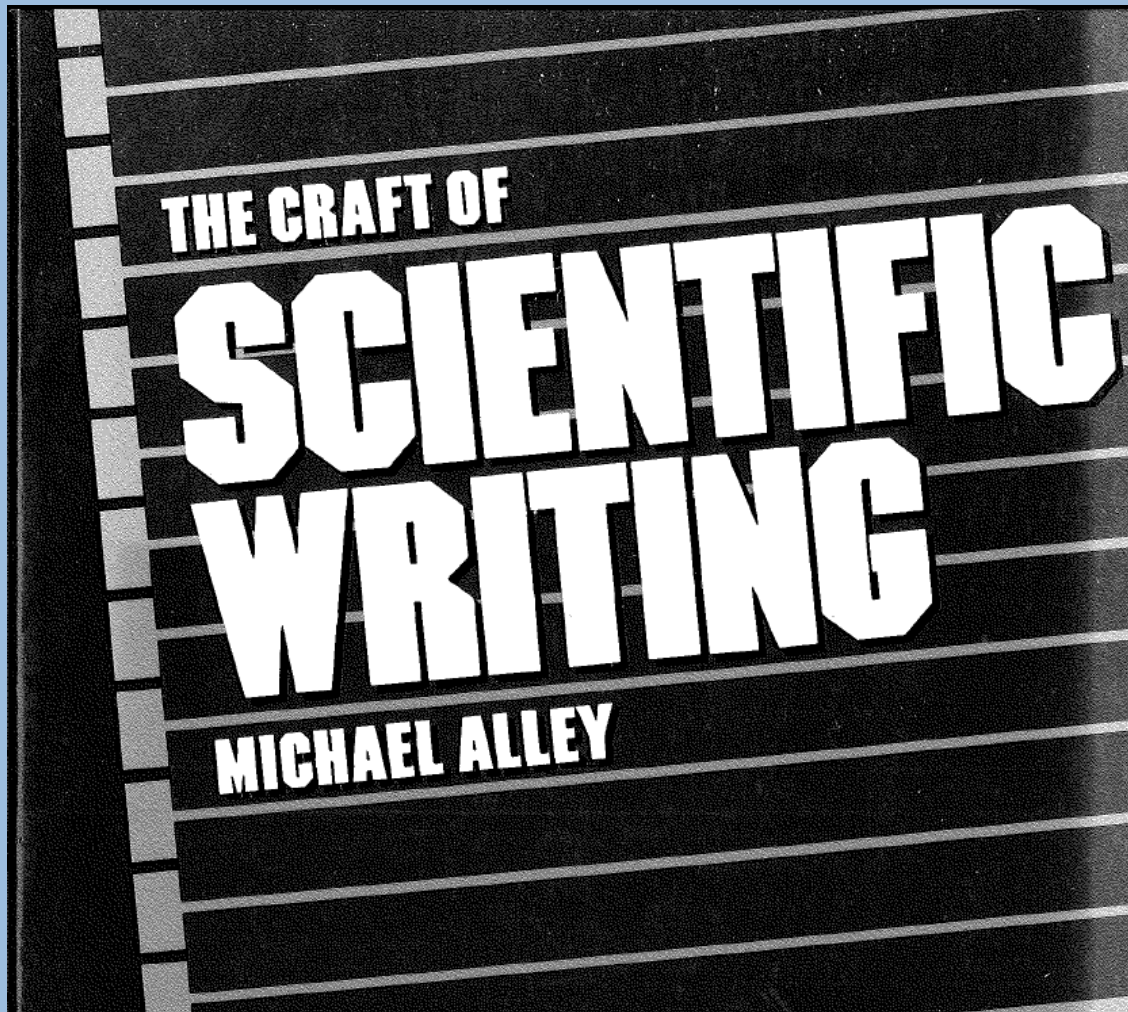
N. Thomas

Physikalisches Institut, University of Bern

..... or “What I Can Say About This In 45 Minutes”

Slide 1

There are books.....



Slide 2

# Topics Requested

- ❖ Language
- ❖ Title and article structure
- ❖ Who is my co-author?
- ❖ Section/chapter content
- ❖ Summary or outlook?
- ❖ Dos and Donts
- ❖ Who has to be acknowledged?
- ❖ The bibliography
- ❖ Important journals in planetary and space science
- ❖ Open source publishing?

# When do I write a paper?

- ❖ To write a paper you have to know what you want to say.
- ❖ Test this.....
  - Write down a few sentences with the conclusions you believe you have.
  - (Experienced authors use this at an early stage to focus their research before they can clearly state the conclusion – they are identifying what results they have to get to reach that conclusion.)
- ❖ Use your supervisor as a sounding board.
- ❖ If the concept is still nebulous, you aren't there yet.
  
- ❖ There is a temptation to try to get away with the minimum content possible.
  - I know ..... But .....

# Which journal?

- ❖ You must decide at an early stage which journal the paper should go to. It makes a big difference.
- ❖ Why?
  - Length of article is obvious (Letters to Nature are 1500 words, JGR papers can be 10 printed pages or more if you are prepared to pay.)
  - Style/language (Nature and Science tend to be very terse – shorter sentences. Same applies to GRL and ApJ Letts.)
  - Templates are different of course. Conversion from one journal style to another at a later date costs work! Do it once is obviously smarter.
  - Reference styles can differ a lot – again selecting early can minimize work later.
- ❖ **READ THE INSTRUCTIONS!!**

# Important Journals (in some sort of order)

## ❖ Champions League

- Nature/Nature Geosciences (increasingly picky on planetary subjects)
- Science (has quotas I believe)

## ❖ Europa League

- Icarus (US standard)
- Geophysical Research Letts. (US quick/short article for geophysics)
- Journal of Geophysical Research – Planets
- JGR – Space Physics
- Planetary and Space Science (European standard – more general than Icarus because of e.g. inclusion of space instrumentation)
- Astrophysical Journal (inc. ApJ Letts.) (good for ground-based/modelling)
- Astronomical Journal (used to have comet papers for example)

# Others Journals of Interest

- ❖ Earth and Planetary Sciences Letts.
- ❖ Acta Astronautica (accepts instrumentation papers)
- ❖ Astrobiology
- ❖ Astrophysics and Space Sciences
- ❖ Earth, Moon and Planets
- ❖ Monthly Notices of the RAS
  
- ❖ Reviews of Geophysics
- ❖ Space Science Reviews

# Techniques and Others

- ❖ Journal of Computational Physics
- ❖ Measurement Science and Technology
- ❖ Journal of Applied Spectroscopy
- ❖ Journal of Atmospheric and Terrestrial Physics
- ❖ Journal of Atmospheric and Solar-Terrestrial Physics
  
- ❖ There are now also a lot of journals being published out of houses in India and Asia.
- ❖ This is where Impact Factor and quality of refereeing plays a role in your choice.
  
- ❖ If in doubt, ask your mentors!



# Example

- ❖ ***The Journal of Astronomy and Space Sciences (JASS)*** is an international journal devoted to the publication of fundamental and applied investigations on all aspects of astronomy, space science, and space technology. It is published quarterly and is the official publication of the Korean Space Science Society since 1984. The Journal is an open access journal; consequently, articles are free for all users to read and use. Topics suitable for publication also include astrophysics, observational astronomy, archaeoastronomy, astrodynamics, geodesy, planetary science, solar physics, spacecraft guidance and navigation, satellite dynamics and control, and all applications of space technology.
- ❖ Remember that you want your paper to be read.

# Titles

- ❖ You want your paper to be cited. You (should) want someone to read your paper.
- ❖ People checking (e.g.) ADS abstracts search for words in titles so make the title work for you.
- ❖ Short (of course).
  
- ❖ What I think about.
  - Put the spacecraft in the title.
  - Put the object in the title.
  - Put the technique in the title.
  - Put the result in the title (if you can).
  
- ❖ The title could be the last thing you write!

# Titles Examples

## ❖ Good Title

- Laboratory photo-goniometric measurements of CO<sub>2</sub> ice: Applications to MRO/HiRISE observations of Mars.

## ❖ Bad Title

- Studies of CO<sub>2</sub> ices at cold temperatures

## ❖ A GOOD TITLE REQUIRES THOUGHT!

- Just because it is short doesn't mean that it isn't important!

# Article Structure

- ❖ Can vary but the general case is
  - Abstract
  - Introduction
    - Explanation of where your research fits in the grand scheme.
    - Finishes with a description of what the rest of the paper is about.
  - Materials and methods
    - This section can be given a more appropriate name and/or split into sub-sections
  - Results
    - Breaking up into sub-sections is often good.
  - Discussion/Conclusions
  - Acknowledgments
  - Bibliography
  
- ❖ There is nothing magic about this.

# Language

- ❖ Most articles are written by non-native speakers.
- ❖ Referees are generous as long as the meaning is clear.
- ❖ Papers ARE rejected because of poor grammar/syntax.
- ❖ It is important to master basic English grammar and syntax.

# Language

## ❖ Basic Tips:

- Keep your sentences short.
- Avoid stringing together large numbers of conditional clauses.
- Keep it simple.
  - Leading the reader step by step is the most effective way of bringing your message across.
- Using the past tense is the usual form.
  - “The instrument was switched on at 13:32:00 UT.”
- BUT, be careful if this is unclear
  - Instead of: The rats were injected with the drug. (sounds like a syringe was filled with drug and ground-up rats and both were injected together)
  - Write: I injected the drug into the rat.
- It is always best to be clear and accurate.
  - You are not writing a novel. T.S. Eliot never published in Icarus.

# Language

- ❖ Basic Tips:
  - Each paragraph must make a clear point.
  - Some authors state the point clearly in the first sentence and then clarify why that point is valid in the rest of the paragraph.
  - This approach is nice because you can then break-up your article structure to the next level down and then all you have to do is to define what each paragraph has to say.

# Referencing

- ❖ New authors commonly don't reference enough.
- ❖ The introduction should be stuffed with references!
  - I guarantee you that there is somebody out there that worked in this field before you.
  - In planetary science, you are in a field that is essentially 70 years old!
- ❖ As I grow older, I am getting increasingly annoyed by people not referencing older works.
  - There was good (AND RELEVANT) science done pre-2005.
  - It doesn't cost ANYTHING to reference previous work. So do it!
- ❖ If you don't have 30+ references you are not trying.
  - P.S. Reading is real good. (I copied and read 400 papers during my thesis work.)
- ❖ Also, a referee will expect to see HIS/HER paper referenced!
- ❖ Not recognizing your colleagues is also pretty .... yuk!



# Who should be my co-authors?

- ❖ Hmmmmm..... this is a tricky one. Always confirm with your mentor.
- ❖ You should try to be inclusive
  - After all ..... Thomas et al. is still Thomas et al. if you add another co-author. 😊
- ❖ However, some journals now request you to state what each co-author did. (E.g. Science.)
- ❖ Contribution of text or figures is clear - yes
- ❖ Contribution of a useful idea - yes
- ❖ Contribution of money – yes (They probably had to write a proposal to get that money don't forget).
- ❖ Correcting my English – no
- ❖ Discussing my work for 5 minutes over coffee – no.

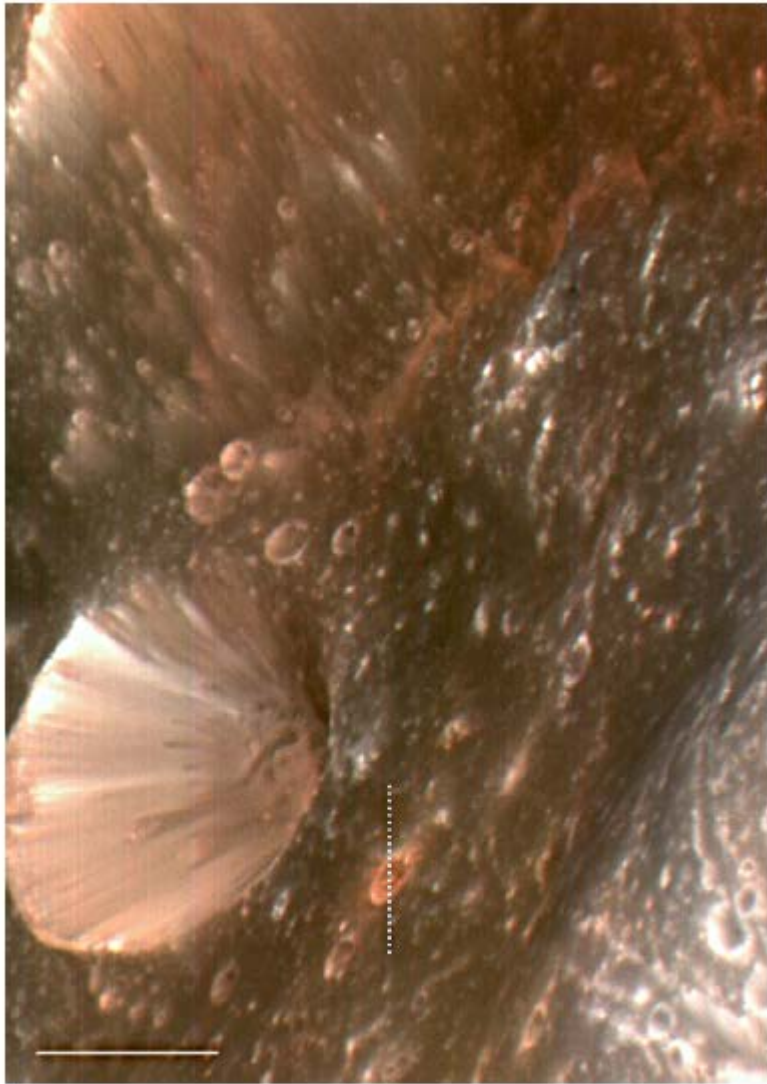
# Graphics

- ❖ You choose to write a paper when you have found out something. In general, you have made some plots which illustrate something important.
- ❖ A technique in constructing a paper is to select your figures first and then write about them!
- ❖ Select your highest impact plots. Make sure they are clear and you can already start to think about figure captions.
  - The figure caption should explain the plots thoroughly!
- ❖ Colour costs money so use it carefully.
- ❖ Try to prepare black and white versions in case your supervisor is bankrupt.
- ❖ Colour is now usually available on-line for free so you can get print b/w and on-line colour.

# Figure Captions

- ❖ I looked for a good example from my own work ..... and didn't find any!
- ❖ You need to explain what the reader is seeing.
- ❖ For data, explain exactly where and when that data was taken and a reference to the dataset used.
- ❖ Try to explain the processing done.
- ❖ You should also try to convey the “take-home message”.

**Fig. 1.** A comparison between image PSP\_002390\_0985 (lower left) and PSP\_002868\_0985 (lower right) taken 37 Sols later ( $L_s = 174^\circ$  and  $196^\circ$ , respectively, LSTs = 16:56 and 17:09, respectively). The position of the sub-images is shown on the larger scale image at the top by the superimposed rectangle. The sub-images are of an area of  $800\text{ m} \times 800\text{ m}$ . A significant amount of fan activity has occurred between the times of the two images. Note also that the orientations of the fans on the right follow the local slope. Fans at the bottom of the image are roughly horizontal, fans at the top of the image point towards the lower left. This is an indication of topographic control of fan direction. Observational conditions for these images (and for all other images presented) are given in Table 1. These data have been geometrically rectified so that the solar azimuth is  $128^\circ$ .



**Fig. 3.** Unsharp masked and contrast-enhanced version of part of PSP\_007769\_0900. Limtoc crater shows significant evidence of debris avalanches extending from the crater sides into the base of the crater. The scale bar is 1 km. The vertical dashed line shows the position of the profile shown in Fig. 15.

# Edit your paper and ask your co-authors

- ❖ A thorough edit and check of your paper takes time.
  - Depending on the complexity, I can edit/read AT MOST 10 double spaced pages per hour. Normally it is nearer 6 per hour!!
  - This is extremely hard work and often authors are too lazy to do it!!!
  - I sometimes get the feeling that authors expect the referees to do this job for them. NO. IT IS NOT THEIR JOB!

# Facts and Speculation

- ❖ It is very important that you separate clearly
  - Facts, Models, Model assumptions, Inferences, and Speculation.
- ❖ Mixing this up can be misleading and is, in the worst case, dishonest.
- ❖ The structure of your paper should help you.
  - Facts are your measurements or observations
  - Models are necessarily approximations so carefully explain them and be careful to state your caveats.
  - Your model will allow you to infer that something is happening.
  - You can then speculate that if something is happening then something else has happened.
- ❖ Papers based on speculation without facts are the scientific equivalent of horoscopes.

# Acknowledgements

- ❖ Funding source is now becoming standard and in some cases required.
- ❖ The guy who corrected your English. 😊
- ❖ NOT, your Mum and Dad..... or your dog.

# Abstract

- ❖ This is possibly the only part of your paper that many people will read – so it is REALLY important.
- ❖ It has to be concise and have all the keywords (abstracts are searchable).
- ❖ Concise means 20 lines or so. 2 page abstracts are not read (at least not by me) - and it is a nonsense.
- ❖ It should be written right at the end (but some authors write it early to guide their thought process .... And then edit it late. Rather like the conclusions approach I spoke about earlier.)



# Example

## A B S T R A C T

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The High-Resolution Imaging Science Experiment (HiRISE) onboard Mars Reconnaissance Orbiter (MRO) has been used to observe Phobos and Deimos at spatial scales of around 6 and 20 m/px, respectively. HiRISE (McEwen et al., JGR, 112, CiteID E05S02, DOI: 10.1029/2005JE002605, 2007) has provided, for the first time, high-resolution colour images of the surfaces of the Martian moons. When processed, by the production of colour ratio images for example, the data show considerable small-scale heterogeneity, which might be attributable to fresh impacts exposing different materials otherwise largely hidden by a homogenous regolith. The bluer material that is draped over the south-eastern rim of the largest crater on Phobos, Stickney, has been perforated by an impact to reveal redder material and must therefore be relatively thin. A fresh impact with dark crater rays has been identified. Previously identified mass-wasting features in Stickney and Limtoc craters stand out strongly in colour. The interior deposits in Stickney appear more inhomogeneous than previously suspected. Several other local colour variations are also evident.

Deimos is more uniform in colour but does show some small-scale inhomogeneity. The bright “streamers” (Thomas et al., Icarus, 123, 536–556, 1996) are relatively blue. One crater to the south-west of Voltaire and its surroundings appear quite strongly reddened with respect to the rest of the surface. The reddening of the surroundings may be the result of ejecta from this impact.

The spectral gradients at optical wavelengths observed for both Phobos and Deimos are quantitatively in good agreement with those found by unresolved photometric observations made by the Imager for Mars Pathfinder (IMP; Thomas et al., JGR, 104, 9055–9068, 1999). The spectral gradients of the blue and red units on Phobos bracket the results from IMP.

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# Referees' reports

- ❖ Everyone gets scared when they see the reports have arrived. It's normal.
- ❖ We ALL have horror stories about referees ..... and we tell them to whoever will listen.
- ❖ Remember >90% of referees are trying to be helpful.
- ❖ Long reports are often the best because they really help you to improve the paper. These people probably spent 3 days working on your paper (and not working on their own paper) so you should take what they say seriously.
- ❖ If a referee didn't understand something it is because YOU didn't write it clearly enough – so re-write it!

# Bad referees' reports

- ❖ It could easily be that you missed something. It happens. Don't be discouraged.
- ❖ You MAY get an unpleasant referee's report (e.g. from someone who hates your supervisor ;) ). This is unprofessional but it happens. This is what editors are for. If you have a fundamental disagreement with a referee, you can ask the editor to adjudicate.
  - A colleague of mine just had a case like this.
- ❖ I stress. This is rare and your first attitude towards a referee's report should be to say to yourself, "Good comment. Let me correct that."

# Questions?

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**UNIVERSITÄT  
BERN**