



A few guidelines on how to write technical papers and reports

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General Line, What is relevant, focus



- ♪ Draw a **General Line** with a logical sequence.
- ♪ Explicitly state the nature of the problem, purpose, scope, methods, results and conclusions.
- ♪ State **what is relevant**. Do not include unnecessary details. They may break the logical presentation of the subject.
- ♪ Keep your focus on the **focus** of your contribution. State the limits of the topic, specially in the introduction and conclusions. Identify what is not yours. References will help with that.
- ♪ What are the contributions? State them very clearly in the Abstract, Introduction and Conclusions.



General Structure (1)



- ♪ Go from the **general** to the **specific** ...
- ♪ ... Inside every Chapter or Section.
- ♪ Identify the context first; only after that go into the details.
- ♪ First chapters provide the context; later chapters the specifics.
- ♪ In a thesis or report, open each chapter with a small introduction, so that the reader is provided with a general idea of what is going to be discussed (this may not be possible in papers due to lack of space.)
- ♪ Repeat the important points of the work three times:
 - ♪ at the beginning of the report/paper, chapter/section.
 - ♪ in the body of the report/paper (in detail).
 - ♪ repeat it at the end of each chapter/section and in the conclusions.



General Structure (2)



Chapter 3 Impacts of Earth's Rotation

In this chapter we will discuss the effects of earth rotation on the human race. We will discuss how it does affect the daily life of humans. We will also prove that earth's rotation causes neither dizziness nor migraines.

3.1. Earth Rotation

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Lay down your ideas with clarity



- ⤵ Describe your ideas clearly.
- ⤵ Avoid chaining several ideas into a single sentence.
- ⤵ Write short sentences.
- ⤵ Break the long sentences with a period.
- ⤵ Long sentences, with lots of ideas, become difficult to follow.
- ⤵ Use examples if it helps to clarify the discussions.

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Do you want your work to be understood?



- ♪ If you answered 'yes' to this question ... then ...

KEEP THE READER IN MIND !!!

- ♪ Typical readers ask in the following order: What? Why? How?
- ♪ While reading ask yourself: what question is a typical reader asking at the end of each paragraph? Provide the answer in the following one.

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What, why, how



- ♪ **Example of questions that permeate the mind of *meddling* readers**
 - ♪ what is the definition of the problem? (what is the question?)
 - ♪ why is the topic important?
 - ♪ how is the problem being solved? (Literature review? Comparing distinct algorithms? Processing data sets? Theoretical developments?) [← methodology]
 - ♪ what are the outcomes of the study?
 - ♪ what are the implications of the study?

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References, references and references ...



- ♪ Writing a thesis, report or paper is the result of a great intellectual effort (at least, it should be)
- ♪ This effort starts with an understanding on the state-of-the-art of the subject being investigated.
- ♪ Therefore, when writing, show your knowledge on what has been done before and currently.
- ♪ Use references galore.
- ♪ Remember that you are not “re-inventing the wheel”.
- ♪ **Plagiarism is crime!**

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Literature review



- ♪ You can show how much aware you are on your topic by presenting a “literature review”.
- ♪ A literature Review can be done in two, non-exclusive ways:
 - ♪ A dedicated chapter or section;
 - ♪ Throughout the text.
- ♪ Typically, the introduction chapter or section makes reference at least to the most significant advances so far.

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The role of Mathematics



♪ *We start with a real world (non-mathematical) problem to be solved.*

♪ *By making necessary assumptions we formulate a model problem to which we can apply mathematical tools – this is a transformation from the real world to the mathematical world.*

♪ *We formulate a solution to the model (mathematical) problem.*

♪ *We interpret what the implications of our mathematical solution may be on our original real world problem – this is the transformation back to the real world.*

♪ *I believe that a full, clear and logical description of the two transformations is absolutely necessary, but often neglected. The assumptions must be discussed. The mathematical results must be interpreted.*

(Wells, 1995)

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Tables, Figures and Plots



♪ Tables, figures and plots exist to aggregate information, allowing for a more effective presentation.

♪ But, they are **not** self-explanatory.

♪ Every table, figure, plot must be explained in the text.

♪ Emphasize (in the text, in the figure) what you want to show.

♪ Describe the figure.

♪ Do not let to the reader to figure out what you want, or you think is *clearly seen*. It may not be as clear as you think.

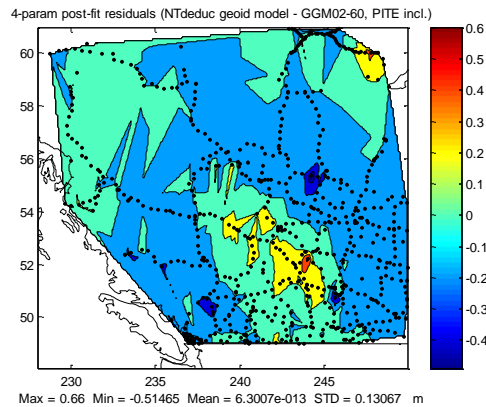
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What not to do



“...a northeast-southwest trend can be clearly seen ...” (can it?)

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Talking about the word “clear” ...



- ⤵ Clear or similar words ... avoid them!
- ⤵ Never use terms such as:
 - ⤵ ... *as can be clearly seen* ...
- ⤵ The reader may think you are arrogant.
- ⤵ Be direct in your explanations. You do not need to qualify your statements.

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What are the last things to write?



- ♪ Introduction
- ♪ Conclusions
- ♪ Abstract
- ♪ Title

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Abstract



♪ “A statement summarizing the important points of a text.”
(<http://www.yourdictionary.com>)

♪ It does not mean “Difficult to understand; abstruse”

♪ Therefore, the Abstract must describe the work:

- ♪ what was done
- ♪ why it was done
- ♪ how it was done
- ♪ results obtained (at least the main ones)
- ♪ conclusions (at least the main ones)

♪ Remember that a reader goes first to the abstract. If it is bad, he/she may lose interest.

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Introduction



- ♪ Think of the Introduction as an “extended” Abstract
- ♪ Same questions as Abstract, but explore in more detail the questions:
 - ♪ what was done?
 - ♪ why was it done?
 - ♪ how was it done?
- ♪ And highlight the results obtained.
- ♪ In addition to these questions, you must include:
 - ♪ how is the investigation placed with respect to the work of others?
 - ♪ what are the contributions of the work?
 - ♪ describe the structure of the report or paper.



Conclusion



- ♪ Summarize the answer to the questions:
 - ♪ what was done?
 - ♪ why was it done?
 - ♪ how was it done?
- ♪ Review your results and present conclusions based on them (remember that you have already discussed your results in previous chapters).
- ♪ Present a list of unresolved or challenging issues that have been identified during the work. Explain them. Put them into the context.



Conclusions (of this presentation)



- Keep the reader in mind
- Keep the focus of your contribution
- Repeat the important points: in the beginning, during and at the end.
- State what is your contribution and what is not.
- Use and abuse of references: show you are aware of what is going on
- Typical readers ask in the following order: What? Why? How?
- Use math carefully
- Never leave table, figures and plots loose in the text.



References



- ㄎ This presentation was prepared based on:
 - ㄎ My own observations along the years.
 - ㄎ David Wells unpublished notes.
 - ㄎ Wendy Wells' Style Manual (<http://gge.unb.ca/Pubs/LN54.pdf>)
 - ㄎ UNB Bulleting "Teaching Voices"
 - ㄎ McKeachie's "Teaching Tips"