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How to write and revise your manuscript in hydrology

Nadav Peleg

University of Lausanne

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Outline

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  - What is the topic of the paper? Storyline, key points, and novelty
  - Choosing the most appropriate journal
- Writing your manuscript
  - How to structure the manuscript?
  - Figures
  - A writer's style, or: how to communicate ideas clearly and concisely
  - AI-based and human-based proofreading
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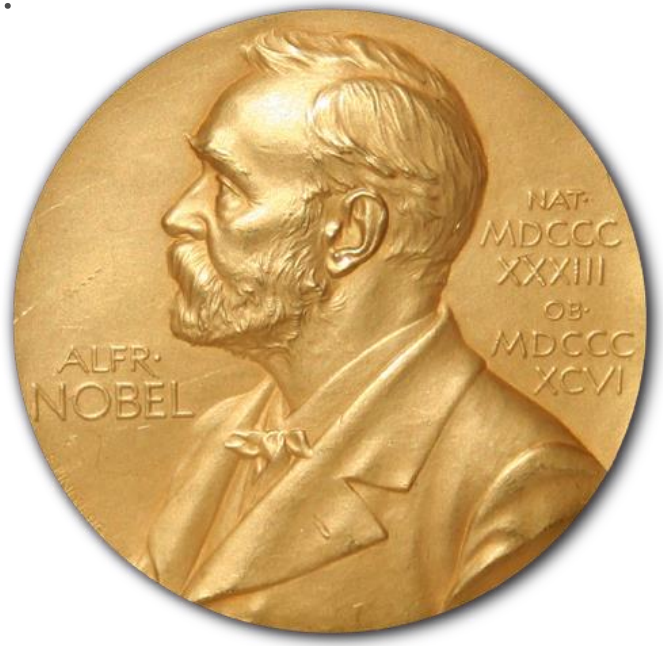
  - The writing of a reply letter to the reviewers

In preparation for writing

It looks like you found amazing results that are going to make a significant impact on the hydrological community. Congratulations!

Hold on... how novel and significant are your results? **Does your research really uncover an unknown process or phenomenon that has not been observed before?** Your first step should be to consult with your colleagues and supervisors and review the literature again.



Okay, you're done. What's next?

What the paper is about?

Come up with a title or summarize your paper in 3-5 bullet points (up to 100 characters) to help you describe its selling point. It's a standard requirement for most journals anyway.

Example for a good summary:

Title: Assessing climate change impact on flood discharge in South America and the influence of its main drivers

- Extreme rainfall events that lead to floods in large rivers are expected to decrease
- Antecedent soil moisture is expected to be reduced in most of South America
- Soil moisture seems more impactful than precipitation regarding ordinary floods

What the paper is about?

And a bad one…

Title: The effects of climate change on lowland hydrology

- Hydrological models were used to model lowland rivers
- A number of climate change scenarios were tested
- Outputs of the model are better than those of existing models

In this example, it is unclear what work was done and what novelty was brought about.

Title

It is important that the title is informative, concise, and catchy.

It should grab the reader's attention and give them a general idea of what the manuscript is about. Avoid using overly complex language or obscure words to ensure the title is understood by the widest possible audience.

The title can be a statement:

> Groundwater recharge in Ghana will decrease by half by 2050

Alternatively, it can simply describe the study:

> A mechanistic model reveals future groundwater recharge in Ghana

There should be a clear indication of the novelty of your paper in your title and summary!

The storyline

Think about the storyline you want to tell the readers before you begin writing.

What is the importance of the topic and why should it be investigated? What methods did you use and why did you choose them? What is the best way to explain the results and introduce the novelty to readers?

Thinking about the paper's figures is a practical way to set up the storyline.

Or drawing a flow chart.

https://www.enago.com/academy/storytelling-in-science-communicating-your-research-effectively/

The journal

It is not (only) about the journal impact factor, but also about the potential readers and the right audience for your manuscript. What are your peers' most impactful publications?

WATER RESEARCH	13.400
npj Clean Water	12.190
DESALINATION	11.211
Water Research X	9.365
Exposure and Health	8.835
International Soil and Water Conservation Research	7.481
Wiley Interdisciplinary Reviews-Water	7.428
Journal of Water Process Engineering	7.340

Journal of Hydrology	6.708
HYDROLOGY AND EARTH SYSTEM SCIENCES	6.617
Agricultural Water Management	6.611
CATENA	6.367
WATER RESOURCES RESEARCH	6.159

How to structure the manuscript?

Stick to hydrological papers' common structure if possible.

The "classic structure"

- Abstarct
- Introduction
- Study area
- Methods
- Results
- Discussion
- Conclusions

A "methodological structure"

- Abstarct
- Introduction
- The method
- Case study
- Results
- Discussion
- Conclusions

Abstract

Essentially, the abstract provides a short description of the work in order to entice the reader to read the paper. The abstract should also provide the motivation and main points of the paper, including methods, results (quantified!), and final conclusions.

A good example of a short abstract:

Over the past two decades, streamflow levels in the Badi River have decreased for unknown reasons. The hydrological budget for this period was examined using the CoolStreamFlow model. Model calibration was performed for the period 1910-1920 and validation was conducted for the period 1920-1930, with NSE values of 0.99. The main finding was that low soil moisture levels in the last decade (a decrease of 600% of the normal) have played a key role in the changes in the hydrological budget.

Abstract

On the other hand, and example of a bad abstract:

Streamflow levels in the Badi River have been examined using the CoolStreamFlow model. The model was calibrated and validated using data obtained in this study. We found that soil moisture has been decreasing in the last two decades.

Not very informative and appealing…

Introduction section

Introductions should include the following information (generally, at least a paragraph per item):

- The motivation (what is known and unknown, the importance of the problem).
- An overview of past studies that have already been conducted on this topic.
- Unanswered questions regarding the topic.
- The advancements you suggest (or the exploration you conducted) and how they will address the open questions.

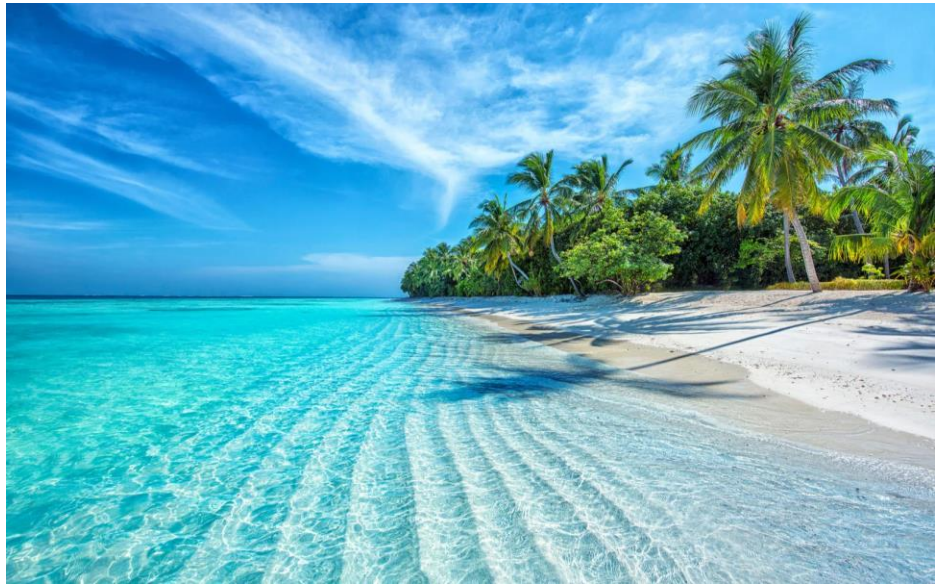
Study area section

In most papers, the section describing the study area is relatively brief.

Provide the necessary information for the study (such as climate, hydrology, geology, etc.), but do not provide unnecessary information, which may be interesting but irrelevant.

For example, a paper studying the impact of deforestation on streamflow in a particular catchment should include information on the catchment area, land cover, and topography, but not the local population size or cultural history…

Another example, major cities located in the study area should be mentioned only if they are necessary for understanding the context of the study.



Methods section

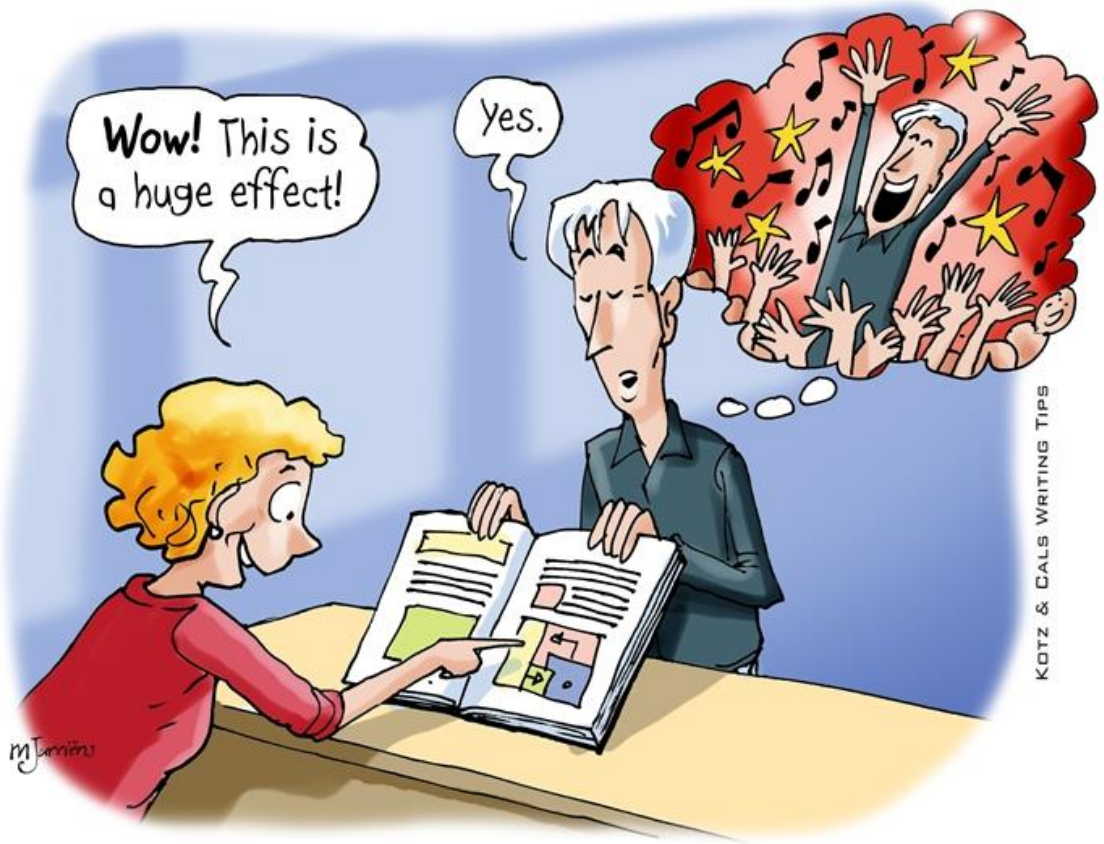
This is one of the most critical sections of the manuscript. **The scientific value of the paper is shallow if readers are unable to understand the methods and the methods cannot be replicated.**

The method should be explained clearly, with proper equations if necessary, and an example should be provided for any steps that the reader may have difficulty following.

My advice is to **follow the style of the benchmark papers in your field** if you are not yet familiar with writing the methods section. Make sure to include the necessary citations for any methods you use from other sources. Do not hesitate to provide a flow diagram or figure illustrating the method if it helps explain it.

Results section

You should report the results of your study without giving them any interpretation (that is the purpose of the discussion section).



Tip 5 - Results: present findings without interpretation!

https://scientificwritingtips.wordpress.com/

Results section

Quantify the results as much as possible, even when referring to figures that illustrate them. For example, do not write "in Fig. 1 we see a positive temperature trend" but rather "a positive temperature trend of 4.3 degrees per week was observed for the period from 1465 to 1478 (Fig. 1)". Another example, instead of stating that the experiment results were "excellent", state the exact values or percentages that you obtained.

Avoid describing your results qualitatively if possible. Use words such as "good", "excellent", and "satisfactory" sparingly.

Discussion section

Describe the **implications** of the results in the discussion section.

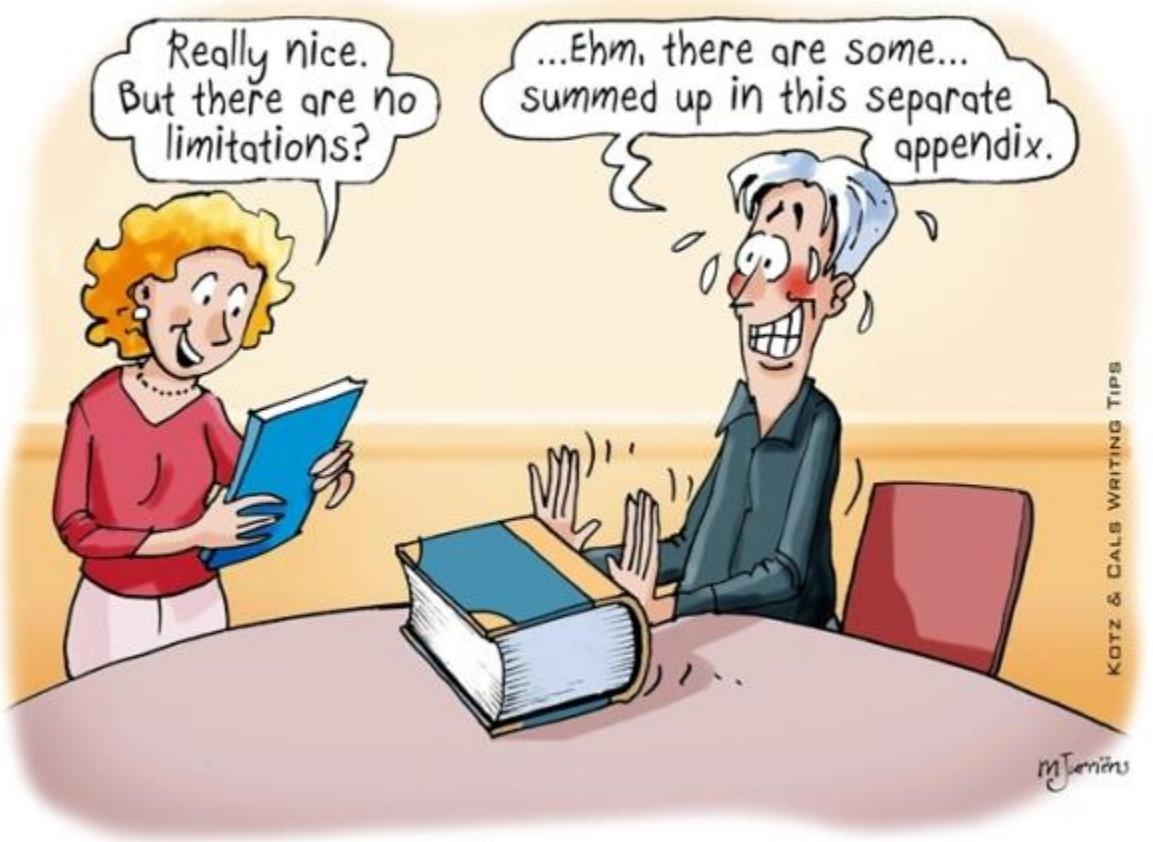
Refer to the results rather than repeating them. As an example, rather than writing "We calculated a positive trend in streamflows of 4% per year, which implies a significant contribution to water availability for the local community," you should write "the positive trend reported in Fig. 1...".

In the discussion section, you can be loose about quantifying the implications of the results and using more informal language.

Discussion section

The following points should be discussed:

- the implications of the results beyond the study
- comparisons with other studies
- improvements suggested by the methods
- limitations of the methods that may limit the implications of the results
- uncertainties
- and future research needs.



Tip 6 - Discussion: be frank in acknowledging limitations!

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Discussion section

I would like to add two notes regarding the discussion section:

- This is an important section that should be separated from the results section (which is sometimes written as "results and discussion").
- In the discussion section, authors may analyze the results further and present both the method and the results of the analysis. Reporting additional "results" in the discussion section is acceptable (if they are relevant to the storyline), but methods should not be included in the discussion section.

Conclusions section

In the conclusion section, the reader is presented with the study's ultimate and most important conclusions. These conclusions should be specific and address the research questions. The conclusion should be clear and succinct, summarizing the main points of the research.

A conclusion of one or two paragraphs is acceptable (even preferred). As this section is not a summary of the paper (if so, it should be called a "summary"), it is unnecessary to summarize all the methods and results presented in the paper. Furthermore, it is not an abstract and should be substantially different from one.

Conclusions section

Here is an example from my own paper of a 1-paragraph conclusion (main results in blue, implications in green):

Examination of a long-term weather radar archive in the eastern Mediterranean showed evidence of an intensification of convective rain cells with warmer near-surface air temperature at the minute scale. Extreme and median peak rainfall intensities of the convective rain cells increase with temperature, while the area slightly decreases or, at most, remains unchanged. The convective areal rainfall was found to increase with warmer temperatures while the areal non-convective rainfall and the storm-wide area decrease. These observations likely point to a redistribution of the available atmospheric moisture from the entire storm toward the convective rain cells due to an enhanced convective activity, resulting in a reduction of total rainfall amount in the entire area at warmer temperatures and a reduced spatial correlation distance of the rainfall fields. Thermodynamic conditions generating convective rain cells were found to be relatively homogenous within the region, whereas dynamic conditions were observed to suppress convection when moving from the main source of moisture, the Mediterranean Sea, toward inland drier areas, that is, reduced convective intensity occurs with reduced moisture availability.

Figures

Several tips:

- Figures should be proportional to the manuscript's length. For example, 20 figures are probably too many for a 10-page manuscript... Keep the total number of figures below 7-8 as a general rule.
- Figures are intended to be seen, so keep the font size reasonable and the lines visible.
- When should the results be presented in a figure or written in the text? You should use a figure if you are able to reduce the length of the text as well as the complexity of the explanation of the results. For example, if you are presenting a large amount of numerical data, a graph would be more effective than a written description of the data.

Figures

Most important:

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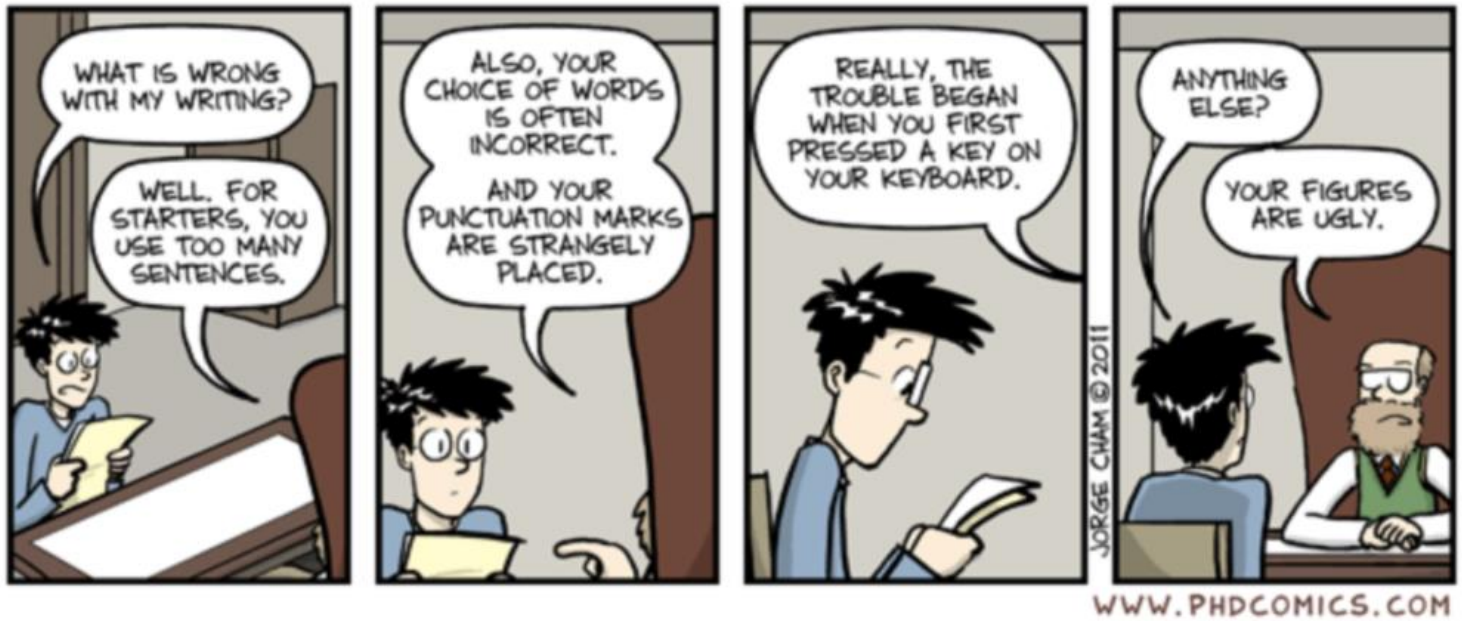
Writing style

- A passive voice or a first-person perspective may be used in your writing. Writing from a first-person perspective engages the reader and allows for a more personal connection (e.g., "We analyzed 20 samples of water for their stable isotope composition with the ChromoSampler"). Passive writing can be useful for conveying information in a clear and concise way, however, it can be seen as dull and unengaging to the reader (e.g., "The ChromoSampler was used to analyze 20 samples of water for their stable isotope composition").
- Be consistent throughout the manuscript regardless of whether you choose to use the active or passive voice.



Writing style

- It is imperative not to mix the tenses. E.g., stick with past tenses if you wrote the introduction in past tenses. Generally, there are no rules regarding the choice of tenses in journals.
- Unless absolutely necessary, do not repeat what has already been written. For example, in the results section, it is not necessary to repeat the explanation of the methods. Instead of writing "The Gan-Pendal analysis, which enables the computation of multiple regressions of streamflow-humidity in complex terrain, indicated a trend of 5%", write "The Gan-Pendal analysis revealed a 5% trend".

AI-based and human-based proofreading

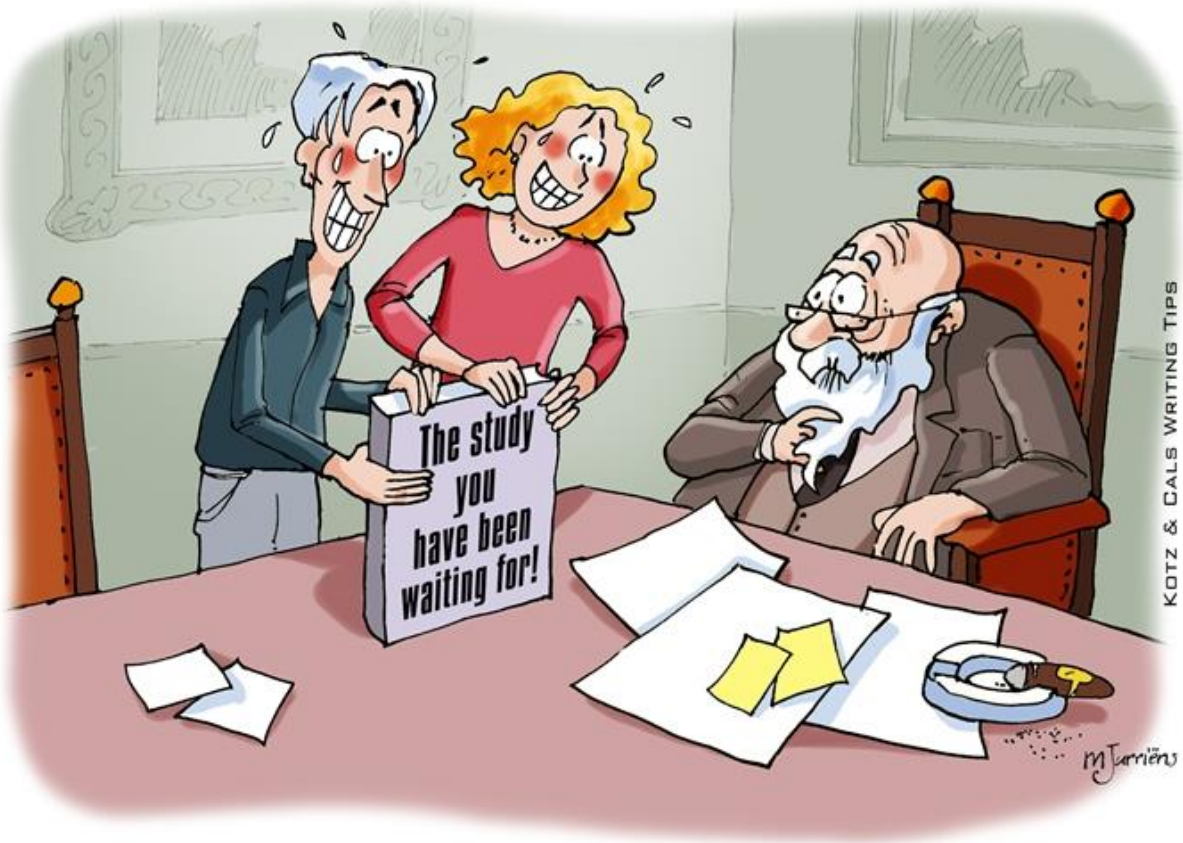
- I would recommend having a native English speaker review the text. Even if you are a native English speaker...
- It is okay to send the text for professional proofreading, but it is strongly recommended that it be done by professionals who are also **experts in the field**, otherwise, the technical language might be lost. For example, a non-expert in hydrology might change the term "turbulent flow" to "streamflow", unaware of the difference between the two.
- You can revise the text using AI-based algorithms. Make sure that the AI corrections are appropriate.

The Supplementary Material

- Supplementary Material is all the additional material that can be used to support the main text. It can include charts, tables, images, videos, or other sources of information.
- Supplementary Material is provided in a separate file from the manuscript for the purpose of helping readers better understand the text and providing additional context.
- Any additional information necessary for understanding the paper but interfering with the flow of the main text should be presented in the Supplementary Material. For example, an illustration of soil thickness within a catchment, which is not critical to understanding the hydrological process described in the manuscript but can be useful, should be included in the Supplementary Material and not in the main text…

The Cover Letter

- It is the purpose of the cover letter to provide the Editor with concise information regarding the novelty of the paper, its relevance to the journal's scope, and why the findings will be of interest to its readers.
- Although not all journals require a cover letter (HESS), it is still recommended to write one even if it is not required (JoH).



Tip 11 - Submitting a paper: write a convincing cover letter!

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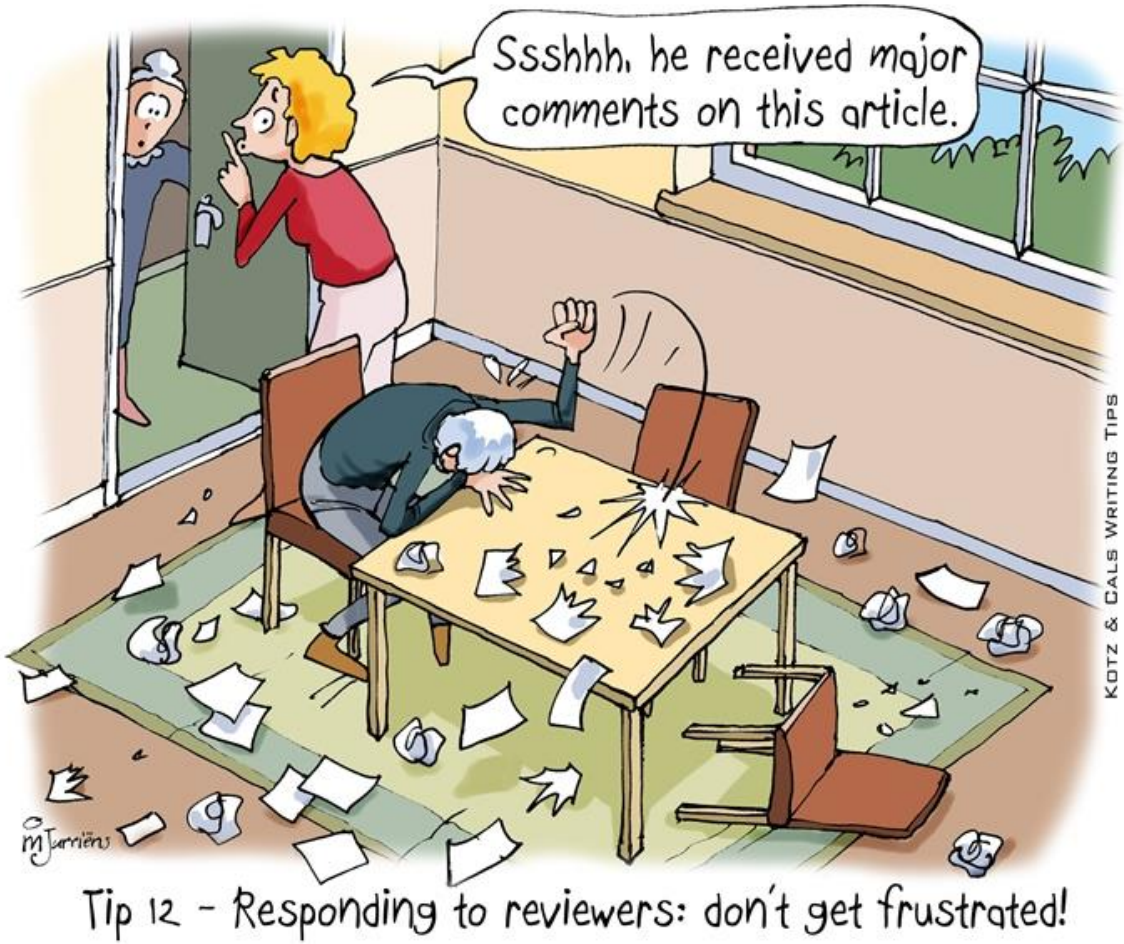
An example of a cover letter

Dear Editor,

We are submitting the manuscript entitled “X” to be considered for publication in X. In future climates, climate change will intensify extreme rainfall and change the distribution of these rainfalls, affecting flash floods significantly. Here, we propose an effective new method for adjusting 2-dimensional design storms to their intensity and spatial structure. We explain and demonstrate the new method, and then present its application in a real case study in X. We compare the newly developed method with two other commonly used methods that uniformly correct rainfall intensities under climate change (that is, without modifying the spatial structure of the rainfall) and show that there can be significant differences between the methods. This new method can be used by hydrologists conducting climate impact studies on floods and mass movement hazards. We believe the manuscript is suitable for X journal and will interest the journal readers. We thank you for your consideration and look forward to hearing from you at your earliest convenience.

Revising your manuscript

- Keep a positive attitude. It is important to keep in mind that the reviewers' aim is to improve the quality of your paper and identify any research gaps you may have overlooked.
- The manuscript should be revised in response to the reviewer's comments and suggestions. It is also an opportunity to read the paper again and revise it further beyond the comments of the reviewer.
- **Don't ignore the reviewer's comments! Consider all of them.**



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The writing of a reply letter to the reviewers

- Provide a point-by-point response in a polite manner. However, do not overdo it. In the event that you receive 30 comments from a reviewer, there is no need to thank them 30 times...
- There is nothing wrong with disagreeing with a comment. However, you should still respond politely and justify your position. For example, if you disagree with a point, you could say "I understand your point of view and appreciate your opinion, but I think the opposite may be true in this case as Sussi et al. (2026) clearly demonstrated that...".
- If a comment is unclear, reply to the reviewer and ask for clarification.
- A figure that does not form part of the main text or even supplementary material may be included in the reply letter to illustrate your point.
- Your responses will be visible to all reviewers and the editor. Ensure that you do not contradict yourself in your responses to different reviewers.

Discussion point: Co-authorship

- Who should co-author your paper and who should not?

That's it for today
Any questions?