

Writing for the Peer-Reviewed Literature



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17 October 2018

Why Write a Paper?

Because you have something to say and you want to be the first to say it.

You want to contribute to the state of scientific knowledge

Yours won't be the final word on the matter, but it shouldn't be a repeat of previous work (prevented by having in-depth, broad, and detailed knowledge of the literature).

Requires patience. The wait time for a paper to be published after submission is protracted.

Writing Style

Make the job of the reader as easy as possible: avoid unnecessary acronyms, say it in as few words as possible (why say “in so far as we can determine” when “we estimate” will do).

Think about your reader: busy, impatient, inundated with papers to read

Read the writing of others and critique as you do (aim for at least a paper a day)

Active voice, present tense (except Methods: “The model simulation was for 3 years”)

Each paragraph should be self-contained and open with a sentence that tells the reader what the paragraph is about.

Be consistent throughout the paper. “ozone” vs “O₃”.

Ban subjectivities: “believe”, “interestingly”, “surprising”.

Being boring is the ultimate sin

Resource: Strunk and White’s Elements of Style

How do you read a paper?

Typical Components of a Paper

Abstract

Introduction

Methods

Results

Discussion

Conclusion

Look out for specific requirements of the journal!

Abstract

Most important part of your paper – reader decides at this point whether it's relevant or interesting. Every sentence must pack a punch!

Write the abstract at the end when the paper is mature and revisit often to edit and improve.

What makes a good abstract?

1. **What is the question?** What questions are the authors seeking to answer?

What specific ideas are being tested in the scientific study?

2. **What was done?** How did the authors answer the questions posed? What methods were used?

3. **What are the results?** What observations and data are presented? What are the conclusions? What is the evidence for the conclusions?

4. **Why is it important?** Why is the answer to the scientific question meaningful? How general are the findings?

Are these four questions addressed in this abstract?

We present a statistical representation of the aggregate effects of deep convection on the chemistry and dynamics of the upper troposphere (UT) based on direct aircraft observations of the chemical composition of the UT over the eastern United States and Canada during summer. These measurements provide unique observational constraints on the chemistry occurring downwind of convection and the rate at which air in the UT is recycled. These results provide quantitative measures that can be used to evaluate global climate and chemistry models.

[Bertram et al., Science, 2007]

How about in this abstract?

Organic aerosol (OA) in the atmosphere consists of a multitude of organic species which are either directly emitted or the products of a variety of chemical reactions. This complexity challenges our ability to explicitly characterize the chemical composition of these particles. We find that the bulk composition of OA from a variety of environments (laboratory and field) occupies a narrow range in the space of a Van Krevelen diagram (H:C versus O:C), characterized by a slope of ~ -1 . The data show that atmospheric aging, involving processes such as volatilization, oxidation, mixing of air masses or condensation of further products, is consistent with movement along this line, producing a more oxidized aerosol. This finding has implications for our understanding of the evolution of atmospheric OA and representation of these processes in models.

[Heald et al., Geophys. Res. Lett., 2010]

How would you write an abstract of your research to date?

Introduction

Convince the reader that your topic is important and that there's a knowledge gap (that you will address by the end of the paper).

Provide copious and appropriate references. You must have at least read the important parts of a paper you cite.

Be brief. Not an exhaustive literature review. Provide only the necessary information to follow the paper.

Layout:

Paragraph 1: What's the problem

Paragraphs 2-3: Background information to follow along

Paragraph 4: Say what your paper is about: "Here we ..."

Methods

Include all detail needed for your work to be reproducible.

Make sure equations or chemical formulae are neat and clear and only used where necessary. No need to bombard the reader with superfluous equations.

Provide accurate references and acknowledgements for datasets.

Refer to previous studies that have described the same methods in detail (e.g. Bey et al. 2001 or the GEOS-Chem manual, rather than an exhaustive description of the model).

Results

Where the journal allows, use a more descriptive title than “Results”, “Validation of China national air quality monitoring network”, for example

Broad outline of the approach (not a repeat of the Methods) to follow the results. Superfluous information: software used (IDL, R, Fortran, Unix).

Ensure a logical flow. Take the reviewer on a progressive journey through your results. A good way to do this is to first lay out your results in a presentation.

Include only some discussion of results (e.g. comparison of your emission inventory to past estimates in the literature).

Figures must be clear and self-contained. Design them so that you (and others) could use it in a presentation.

State in the caption what the figure shows, include units, and label all colors, lines, symbols, axes.

Discussion

Opportunity to demonstrate the implications of your results (NO_x emissions have declined more rapidly than is estimated from the surface observations; our analysis of long-term changes in MODIS LAI show that charcoal production in Africa is not sustainable).

Keep brief. No more than 5-6 paragraphs.

Conclusion

Take-home messages of the paper.

Short papers (e.g. Environmental Science and Technology Letters or Environmental Research Letters often don't warrant a dedicated Conclusion section).

Becoming a Productive and Prolific Writer

Make a writing schedule and stick to it

Set aside an hour each day when you focus on writing

Turn off distractions (phone, email alerts), work somewhere quiet

Track your progress (words/pages per session)

Work in a group to hold each other accountable

Where to Submit?

Atmospheric Chemistry and Physics – costly, but online discussion options, no length limits

Environmental Science and Technology – free if don't opt for open access

Environmental Research Letters (ERL) – short, discursive, general

Journal of Geophysics– specific to Atmospheric Science

Geophysical Research Letters (GRL) – short, discursive, higher rejection rate than ERL

Atmospheric Environment – general, longer form than ERL and GRL

Science of the Total Environment – general (not very high impact)

Environmental Health Perspectives

... Many other options.

Be vigilant of predatory publishers and journals!

Order of Co-authors

No formal rubric

Be generous. Including international, prolific co-authors also gets you known.

First author: person who led the research

Second author: supervisor (some like to be listed at the end)

Next: data providers or code developers in order of critical need to research

What about satellite observations? Look for guidelines on how to acknowledge use of this data on the data portals.

Do you include your co-supervisor? What did they contribute? Is this sufficient to warrant co-authorship?