

Writing for the Peer-Reviewed Literature



Nairobi Air Quality Workshop

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Why Write a Paper?

Our publication record is also frequently how we're judged (for better or worse). Some metrics that are used include the number of publications, number of citations, quality of journals submitted to.

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

You want to contribute something new to scientific knowledge.

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

For researchers, publishing is our bread and butter.

Quality of journals is quantified using the **impact factor** (e.g. 34 for Science, 38 for Nature, 3 for Atmospheric Environment, 5 for Atmospheric Chemistry and Physics).

Options to track your progress and build your profile:

Use Google Scholar or ISI Web of Science to quantify your publication record. I prefer Google Scholar as it's easier to customize, update and maintain than ISI. Also provides a complete publication record to refer to when putting together a CV.

Screenshot of my private Google Scholar page

Article title

Articles ordered by number of citations

Number of citations

h-index

Author list

Citations in each year

Citations for each article

The screenshot displays the Google Scholar profile of Eloise Marais, a researcher at the University of Leicester. The profile includes a circular profile picture, a 'FOLLOW' button, and a list of research interests: Atmospheric Chemistry, Earth observations, and air quality. The main section shows a list of articles, each with a checkbox, title, author list, journal information, and citation count. The articles are sorted by the number of citations in descending order. To the right, there is a 'Cited by' section with a table showing total citations (954), h-index (16), and i10-index (20). Below this is a bar chart showing the number of citations received by the articles each year from 2012 to 2019. The chart shows a steady increase in citations over the years, peaking in 2018.

Article Title	Cited By	Year
<input type="checkbox"/> Why do models overestimate surface ozone in the Southeast United States? KR Travis, DJ Jacob, JA Fisher, PS Kim, EA Marais, L Zhu, K Yu, ... Atmospheric chemistry and physics 16 (21), 13561-13577	115	2016
<input type="checkbox"/> Aqueous-phase mechanism for secondary organic aerosol formation from isoprene: application to the southeast United States and co-benefit of SO2 emission controls EA Marais, DJ Jacob, JL Jimenez, P Campuzano-Jost, DA Day, W Hu, ... Atmospheric Chemistry and Physics 16 (3), 1603-1618	93	2016
<input type="checkbox"/> Isoprene emissions in Africa inferred from OMI observations of formaldehyde columns EA Marais, DJ Jacob, TP Kurosu, K Chance, JG Murphy, C Reeves, ... Atmospheric Chemistry and Physics 12 (14), 6219-6235	88	2012
<input type="checkbox"/> Global budget and radiative forcing of black carbon aerosol: Constraints from pole-to-pole (HIPPO) observations across the Pacific Q Wang, DJ Jacob, JR Spackman, AE Perring, JP Schwarz, N Moteki, ... Journal of Geophysical Research: Atmospheres 119 (1), 195-206	86	2014
<input type="checkbox"/> Photocatalysis of 4-nitrophenol using zinc phthalocyanine complexes E Marais, R Klein, E Antunes, T Nyokong Journal of Molecular Catalysis A: Chemical 261 (1), 36-42	85	2007
<input type="checkbox"/> Adsorption of 4-nitrophenol onto Amberlite® IRA-900 modified with metalophthalocyanines E Marais, T Nyokong Journal of hazardous materials 152 (1), 293-301	73	2008
<input type="checkbox"/> A new mechanism for atmospheric mercury redox chemistry: Implications for the global mercury budget HM Horowitz, DJ Jacob, Y Zhang, TS Dibble, F Slemr, HM Amos, ... Atmospheric Chemistry and Physics 17 (10), 6353-6371	51	2017
<input type="checkbox"/> Organic nitrate chemistry and its implications for nitrogen budgets in an isoprene- and monoterpene-rich atmosphere: constraints from aircraft (SEAC ⁴ RS) and ... JA Fisher, DJ Jacob, KR Travis, PS Kim, EA Marais, C Chan Miller, K Yu, ... Atmospheric chemistry and physics 16 (9), 5069-5081	50	2016

	All	Since 2014
Citations	954	869
h-index	16	16
i10-index	20	20

Citations in each year

Year	Citations
2012	10
2013	10
2014	20
2015	30
2016	40
2017	50
2018	60
2019	10

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?

Your Homework Task

Write an abstract of your research using the 4 questions on Slide 10

- a. Answer the 4 questions on Slide 10**
- b. 200 word limit**
- c. Read, re-read, edit, refine**
- d. Do peer-to-peer evaluation of abstracts on Thursday at 11:30am**

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).

How to become a productive and prolific writer

Writing is challenging, exhausting, and sometimes you just don't feel like it.

Some suggestions on improving your writing and productivity:

- Develop a **writing schedule** and stick to it! Set aside an hour a day to write productively and without any disturbances.
- Keep a **writing journal** to track your productivity. This could be an Excel spreadsheet of the number of pages written each day, number of papers and proposals submitted each year etc.
- Get experienced writers to **critique your writing**
- Learn to be critical of your own writing (Is this the most effective word to use? Can I say this more concisely? Is this accessible to the reader?).
- Form a **writing group** to motivate each other to stick to a writing schedule, develop writing targets, and hold each other accountable if targets aren't met.
- **Read a lot and extensively.** Read fiction, non-fiction, science articles, policy articles, newspaper articles. Identify phrases that work well. Keep a dictionary or your phone close by to look up new words that you might be able to incorporate in your writing.
- Subscribe to email lists for relevant journals to receive alerts of new articles if you're looking for new material to read.

Where AQ Researchers 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. Develop your own based on discussions with researchers you know to be ethical.

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?

Resources

Some books about writing and writing styles:

The Elements of Style, Strunk and White

How to Write a Lot: A Practical Guide to Productive Academic Writing, Paul Silvia

On Writing, Steven King

Consider subscribing to receive article alerts from the following journals:

(All journals provide clear instructions on how to subscribe to their email lists)

Environmental Science and Technology

Atmospheric Chemistry and Physics

Geophysical Research Letters

Nature, Nature Climate Change, Nature Geosciences

Science

Environmental Research Letters

Journal of Geophysical Research

Specific Published Opinions:

Ten Simple Rules for Structuring Papers, PLOS ONE, Mensh and Kording

Writing Tips, http://www.dansimons.com/resources/writing_tips.html, Simmons

The Art of Writing Science, Protein Science, K. W. Plaxco

So You're Writing a Paper, Nature Methods, editorial

The Write Stuff, Nature Careers, March 2018