What are the main parts in this conclusion ?

Control is a central issue in most complex systems, but because a general theory to explore it in a quantitative fashion has been lacking, little is known about how we can control a weighted, directed network—the configuration most often encountered in real systems. Indeed, applying Kalman's controllability rank condition (equation (3)) to large networks is computationally prohibitive, limiting previous work to a few dozen nodes at most. Here we have developed the tools to address controllability for arbitrary network topologies and sizes. Our key finding, that N_D is determined mainly by the degree distribution, allows us to use the tools of statistical physics to predict N_D from $P(k_{in}, k_{out})$ analytically, offering a general formalism with which to explore the impact of network topology on controllability.

The framework presented here raises a number of questions, answers to which could further deepen our understanding of control in complex environments. For example, although our analytical work focused on uncorrelated networks, the algorithmic method we developed can identify N_D for arbitrary networks, providing a framework in which to address the role of correlations systematically. Taken together, our results indicate that many aspects of controllability can be explored exactly and analytically for arbitrary networks if we combine the tools of network science and control theory, opening new avenues to deepening our understanding of complex systems.

What are the main parts in this conclusion ?

Exercise

Control is a central issue in most complex systems, but because a general theory to explore it in a quantitative fashion has been lacking, little is known about how we can control a weighted, directed network—the configuration most often encountered in real systems. Indeed, applying Kalman's controllability rank condition (equation (3)) to large networks is computationally prohibitive, limiting previous work to a few dozen nodes at most. Here we have developed the tools to address controllability for arbitrary network topologies and sizes. Our key finding, that N_D is determined mainly by the degree distribution, allows us to use the tools of statistical physics to predict N_D from $P(k_{in}, k_{out})$ analytically, offering a general formalism with which to explore the impact of network topology on controllability.

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Conclusion : to avoid

- Avoid rhetoric and personal statements

> *“In the end, this study was enriching because it allowed me to discover a laboratory, and also learn how a high-resolution mass spectrometer works."*

- Avoid jargon that can be understood only by reading the full article

> *“The ZX232 protocol, which we have introduced the MVA method for DBAs, outperforms the older ZH127 protocol for extracting…”*

Alternative formats

- Conclusions with bullets offers extra conciseness and clarity

To summarise, our study reveals that:

- *The intrinsic properties of ****
- *No substitute has be found for ****
- *An enhancement of *****

Together, these results suggest that ….

Take home message

- Not all conclusions need to be structured : e.g. Nature

Check for updates

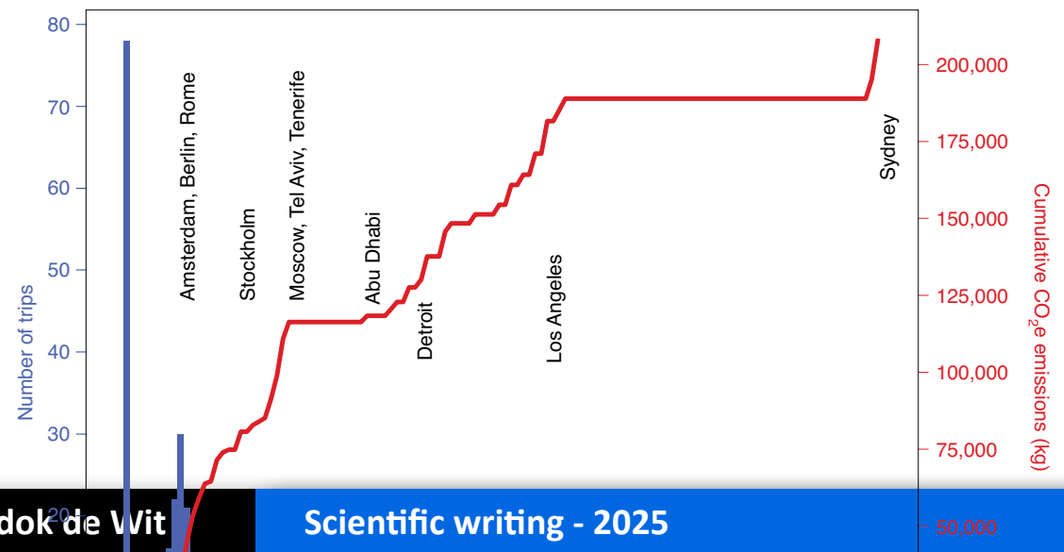
comment

The carbon footprint of large astronomy meetings

The annual meeting of the European Astronomical Society took place in Lyon, France, in 2019, but in 2020 it was held online only due the COVID-19 pandemic. The carbon footprint of the virtual meeting was roughly 3,000 times smaller than the face-to-face one, providing encouragement for more ecologically minded conferencing.

Leonard Burtscher, Didier Barret, Abhijeet P. Borkar, Victoria Grinberg, Knud Jahnke, Sarah Kendrew, Gina Maffey and Mark J. McCaughrean

The scientific evidence that we live in a climate emergency calls for urgent action[1]. As a society, we are collectively failing to live within our environmental boundaries[2], with possibly catastrophic consequences for human civilization[1]. The time to address these issues is now[1,3]. The United Nations Emissions Gap Report from 2019 states that each year a global reduction of emissions of 7.6% is required to limit the average global temperature rise to 1.5 °C (ref. [3]) — the target that was outlined in the Paris Agreement in 2016. At the current rate of emissions, we will exceed the 'carbon budget'



Take home message

emissions of joining EAS 2020 compared to working in the home office.

The future of conferencing

We conclude that the internet-related emissions of EAS 2020 were negligible compared to the travel-related emissions alone of EWASS 2019. This finding is in common with other recent estimates for large international conferences, for example, a virtual annual meeting of the American Geophysical Union (AGU) was calculated to emit less than 0.1% of the travel emissions of the face-to-face AGU 2019 meeting[16].

One approach to cut emissions while retaining scientific and social connections globally is to 'attach' smaller satellite meetings to the large annual meetings of the respective regional astronomical societies. For example, the weeks before and after the (Northern Hemisphere) winter American Astronomical Society and (Northern Hemisphere) summer EAS meetings could be used for smaller meetings that are held in the vicinity, requiring minimal extra travel emissions to join them. A meeting schedule could be coordinated globally by the International Astronomical Union.

fall thanks to an increasing fleet of night trains across Europe at least and, in the future, short flights that can be powered by synthesized fuel or batteries. Such a scheme of regional hubs has been tried and evaluated as successful by various groups in the last year[17,18].

Lastly, we also see a possibility to move to an entirely online meeting format without any (large) physical meetings in the future. Such meetings could be held in the 'nearly carbon neutral conferencing' format[19], that is, essentially with pre-recorded talks and live discussion sessions, to minimize the time where everyone needs to be online simultaneously, and therefore allow global collaboration across many time-zones.

The emerging picture is that there is a real opportunity for future meetings to adopt practices that provide a range of attendance possibilities for participants, which promote a more sustainable, accessible and diverse meeting concept for the growing international community. While discussions are ongoing regarding the future of meetings, we expect that the post-COVID-19 future will hold a mix of purely virtual conferences, next to hybrid meetings where some participants join in person and others use a

7. Portegies Zwart, S. *Nat. A* 020-1208-y (2020).
8. Flagey, N., Thronas, K., P *Nat. Astron.* https://doi.o
9. Barret, D. *Exp. Astron.* **49**
10. *Emissions de CO2 Marche* wp-content/uploads/201
11. Jahnke, K. et al. *Nat. Astr* 1202-4 (2020).
12. Muntean, M. et al. *Fossil* (*2018 Report* (Publication https://go.nature.com/3g
13. *Zoom Bandwidth Require* https://support.zoom.us/
14. Aslan, J., Mayers, K., Koo 785–798 (2018).
15. *Overview of Electricity Pr* https://go.nature.com/2Q
16. Klöwer, M., Hopkins, D., 356–359 (2020).
17. Abbott, A. *Nature* **577**, 13
18. Reshef, O. et al. *Nat. Rev.*
19. Hiltner, K. *A Nearly Carb* https://hiltner.english.ucs

Acknowledgements

L.B. would like to ackno on a draft article from M L. Kaper, S. Lucatello, S. A. Schouten-Voskamp.

Competing interests

L.B. was a member of the EAS 2020 meeting. M.J.M organizing committee of remaining authors declar

One last thing…

- Good conclusions mirror the **question** that was asked in the introduction and clearly show what progress has been made
  - Where did we start from ?
  - What did we achieve ?
  - What should the next steps be ?

Take home message

- Highlight your **take home message**

If the reader had to remember one single sentence, what should it be ?

YOU should decide what matters rather than let the reader guess it

Take home message: example

Control is a central issue in most complex systems, but because a general theory to explore it in a quantitative fashion has been lacking, little is known about how we can control a weighted, directed network—the configuration most often encountered in real systems. Indeed, applying Kalman's controllability rank condition (equation (3)) to large networks is computationally prohibitive, limiting previous work to a few dozen nodes at most. Here we have developed the tools to address controllability for arbitrary network topologies and sizes. Our key finding, that N_D is determined mainly by the degree distribution, allows us to use the tools of statistical physics to predict N_D from $P(k_{in}, k_{out})$ analytically, offering a general formalism with which to explore the impact of network topology on controllability. The framework presented here raises a number of questions, answers to which could further deepen our understanding of control in complex environments. For example, although our analytical work focused on uncorrelated networks, the algorithmic method we developed can identify N_D for arbitrary networks, providing a framework in which to address the role of correlations systematically. Taken together, our results indicate that many aspects of controllability can be explored exactly and analytically for arbitrary networks if we combine the tools of network science and control theory, opening new avenues to deepening our understanding of complex systems.

Take home message: example

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9. Acknowledgements

Acknowledgements

- Thank the people who
  - Contributed in some way to the study
  - Who commented on the manuscript
  - The referees (if they were helpful)
  - Provided the free software (e.g. python modules)
  - And always thank your **funding agencies** (mandatory !)
- Be very factual.
  - Avoid : *“and I thank Lizz and Jim for making coffee…”*
- Mention people explicitly when known

Acknowledgements

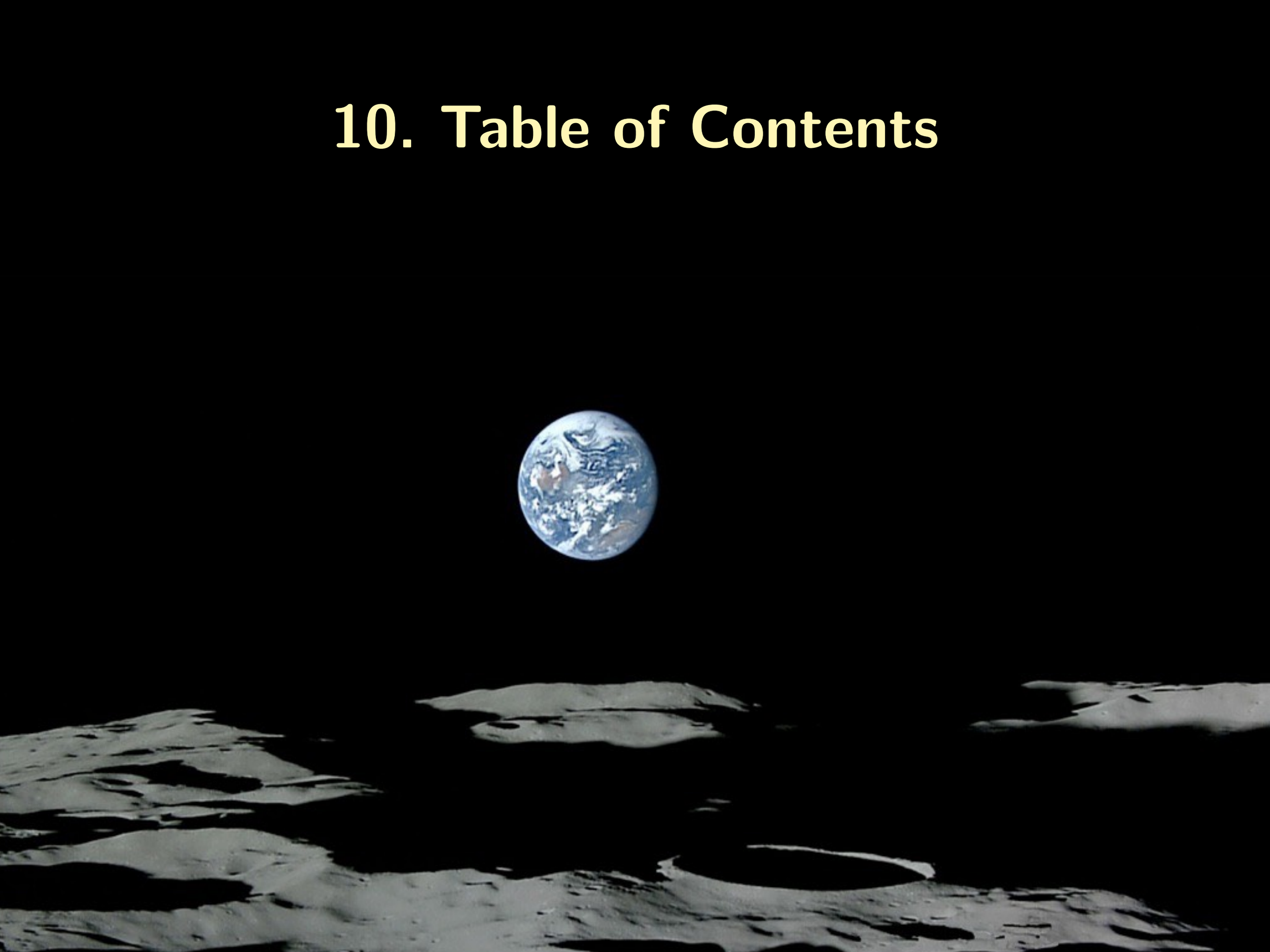
Failing to acknowledge your sponsors or funding agencies may cause your funding to be suspended.

This is critical for EU-funded projects.

Acknowledgements

- Check what are the rules for thanking your funding agency
- Example:
  "P. M. and M. K. gratefully acknowledge the International Space Science Institute (ISSI, Bern) for hospitality. This study received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under the grant agreement number 218816 (SOTERIA project) and from the Programme National Soleil-Terre (PNST). We also thank Thomas Benseghir and Nolwenn Marchand for their assistance in the data analysis. The AIA data are courtesy of SDO (NASA) and the AIA consortium."

10. Table of Contents



- When is a table of contents needed / useful ?

Table of Contents

- TOCs are not required, except for long reviews and theses
- **Tip**: build the table of contents even if not needed and check whether the titles/subtitles are consistent

This is easy with LaTeX : just add `\tableofcontents`

What to change in this Table of contents ?

11. Supplementary material

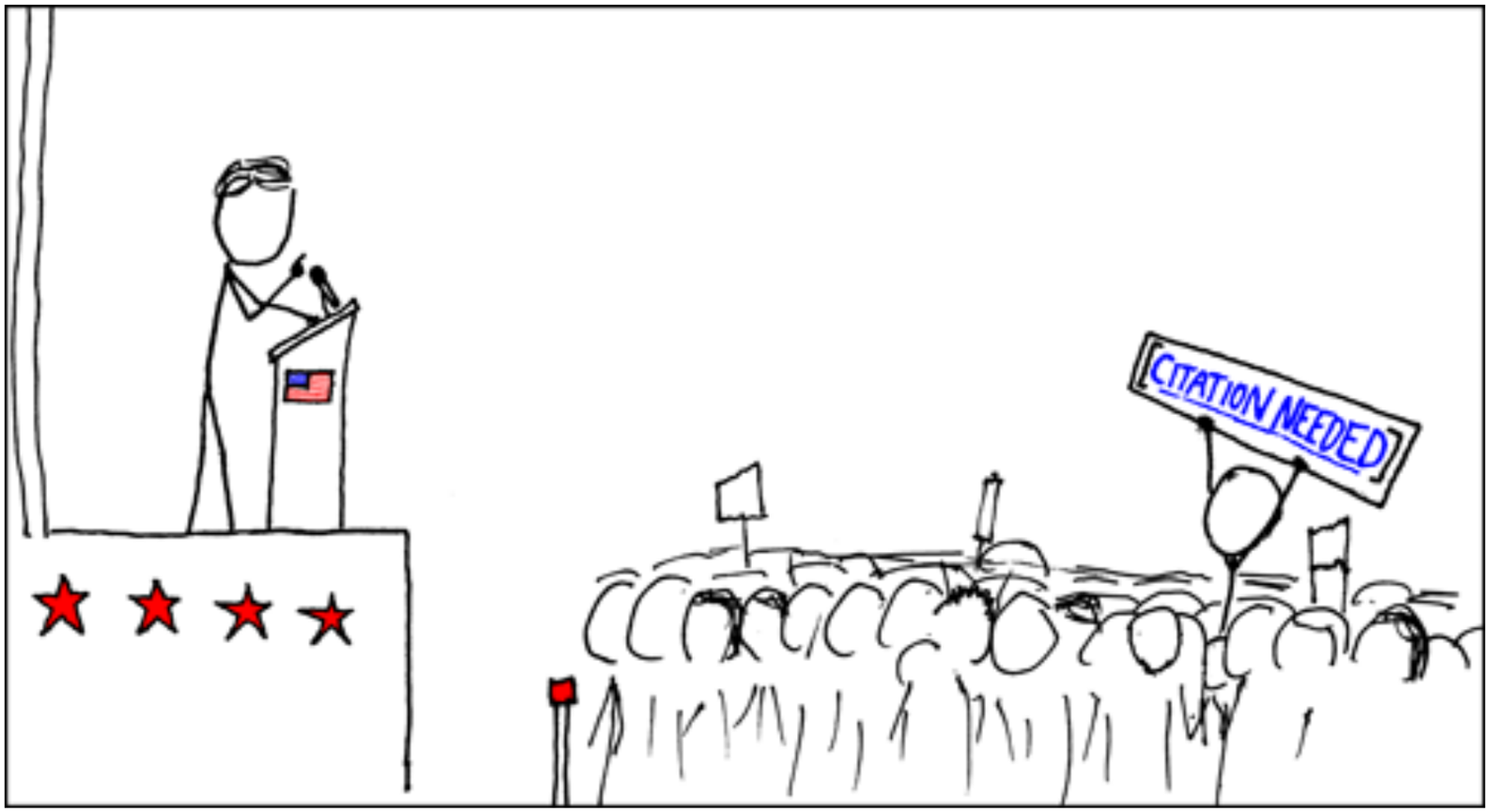
Supplementary material

- Supplementary material = everything that may be useful to some but would distract the reader from the main message if put in the core of the article
- Use with moderation

References

References

- Your sources of information must be cited
- …but these citations must be reliable
  - Perennial
  - Easy to find



https://xkcd.com/285/

What is eligible for a citation in a scientific article ?

book with ISBN
book without ISBN
website with date of last visit
website
abstract submitted to a conference
peer-reviewed article, not in English
article in mainstream newspaper
proceedings of a conference (published)
technical report
PhD thesis
submitted (but not yet accepted) article
article in preparation (not yet submitted)
preprint in archive (e.g. ArXiV)

What is eligible for a citation in a scientific article ?

book with ISBN	always
book without ISBN	no
website with date of last visit	usually not
website	no
abstract submitted to a conference	no, unless in specific cases, when published in a book
peer-reviewed article, not in English	only if necessary
article in mainstream newspaper	no (there are exceptions in humanities)
proceedings of a conference (published)	no, unless in specific cases, when published in a book
technical report	if necessary
PhD thesis	if necessary
submitted (but not yet accepted) article	no, use instead (Name, personal communication)
article in preparation (not yet submitted)	never
preprint in archive (e.g. ArXiV)	some journals accept preprints

How to cite ?

- Each journal has its own rules
- Examples
  - Recent studies [2] and...
  - Recent studies [MacKay et al., 2018] and...
  - Recent studies (MacKay et al., 2018) and...
  - Recent studies by MacKay et al. (2018), and…
- See for example the Chicago Manual of Style : https://www.chicagomanualofstyle.org/home.html

Degtyarev, V. I., Kharchenko, I. P., Potapov, A. S., Tsegmed, B., and Chudnenko, S. E.: Qualitative estimation of magnetic storm efficiency in producing relativistic electron flux in the Earth's outer radiation belt using geomagnetic pulsations data, Adv. Space Res., V. 43 (5), 829–836, doi:10.1016/j.asr.2008.07.004, 2009.

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Delouille V., Mampaey B., Verbeeck C., and de Visscher R, The SPoCA-suite: a software for extraction and tracking of Active Regions and Coronal Holes on EUV images, Arxiv e-prints, 1208.1483, 2012.

Dow J.M., R. E.Neilan and C.Rizos, The International GNSS Service in a changing landscape of Global Navigation Satellite Systems, Journal of Geodesy, 83:191–198, DOI: 10.1007/s00190-008-0300-3, 2009.

Egorova, T., Rozanov, E., Ozolin, Y., Shapiro, A., Calisto, M., Peter, T., and Schmutz, W.: The atmospheric effects of October 2003 solar proton event simulated with the chemistry-climate model SOCOL using complete and parameterized ion chemistry, J. Atmos. Sol.-Terr. Phys., 10 73(2–3), 356–365, doi:10.1016/j.jastp.2010.01.009, 2011.

Feltens, J., M. Angling, N. Jackson-Booth, N. Jakowski, M. Hoque, M. Hernández-Pajares, A. Aragón-Àngel, R. Orús, and R. Zandbergen (2011), Comparative testing of four ionospheric models driven with GPS measurements, Radio Sci., 46, RS0D12, doi:10.1029/2010RS004584.

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How to cite ?

- Lists of references are often full of errors

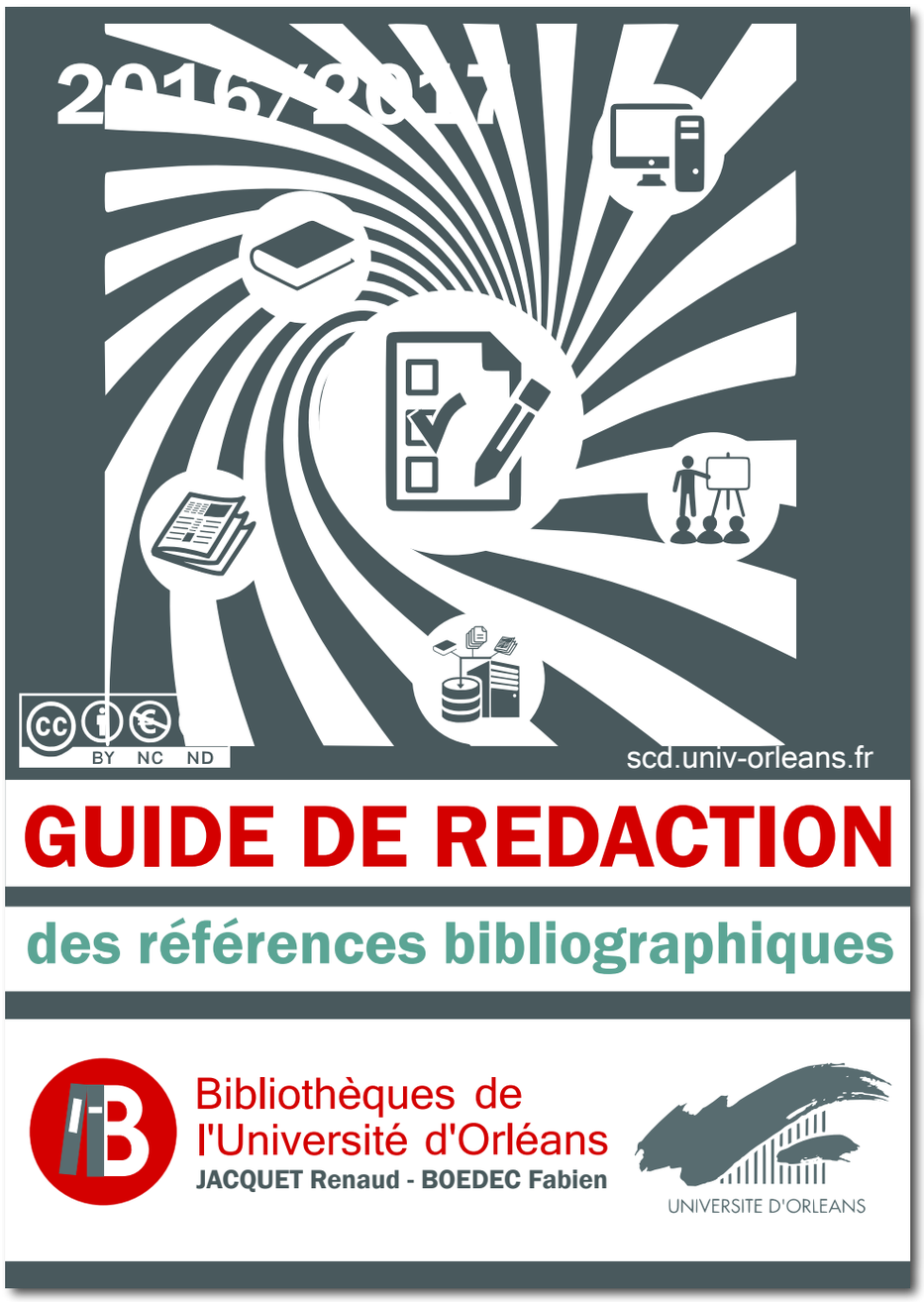
  “Sloppy citations = sloppy writing = sloppy work”

Use as much as possible automated tools for collecting (ZOTERO...) and displaying (BiBTeX...) references.
But even these are not devoid of errors

How to cite ?

- There are excellent tools around (EndNote, JabRef, Mendeley, BiBDesk…) for collecting and handling references

How to cite ?



Available on Celene and on https://scd.univ-orleans.fr/sites/default/files/contributeurs/guide-biblio-orle.pdf

Where should I publish ?

Different types of article : choose the proper one

- **Journal paper**: presents final original results, careful description of technique etc., refereed
- **Special issue** : in general, following a conference. More focused, but with hard deadlines.
- **“Letter to the Editor” or Rapid communication:** short research paper that requires rapid publication (sometimes esteemed higher than regular papers) refereed
- **Review paper**: summarises, evaluates and synthesises results already published elsewhere. Generally on invitation only. No description of personal achievements.
- **Proceedings paper**: Often preliminary results. Short, sometimes speculative and often not as important as a journal paper
- **PhD thesis:** Combination of above, but much more challenging !

Where to publish ?

Criteria to take into account

Where to publish ?

Criteria to take into account

- What is the audience of the Journal ?
- In what countries will the journal be mostly read ?
- Impact Factor
- Publication charges
- Quality of the editorial procedure: how many reviewers ?
- How long does it take to get the article online ?
- Details: online version, colour vs black/white figures
- …

Impact factor

- Impact factor
  = average of citations per publication of the last 2-3 years
  = proxy for the relative importance of a journal within its field

$$IF_y = \frac{\text{citations}_{y-1} + \text{citations}_{y-2}}{\text{publications}_{y-1} + \text{publications}_{y-2}}$$

- Usually provided by Scopus or by Web of Science
- See: https://www.scijournal.org

Impact factor : examples (2018)

- Acta Geophysica : 0.9
- Annual Review Biochemistry : 19.9
- Applied Physics Letters : 3.4
- Astronomy & Astrophysics : 5.2
- Astrophysical Journal : 5.5
- Atmospheric Research : 3.8
- Combustion and Flame : 3.7
- Fuzzy Sets and Systems : 2.7
- Geophysical Research Letters : 4.3
- Int Journal Modern Sciences and Technology : 0.7 (*predatory*)
- Int Journal Science and Nature : 0.9 (*predatory*)
- International Journal of Engineering Science : 4.4
- Journal of Geophysical Research : 3.31
- Journal of Hazardous materials : 6.6
- Living Reviews in Solar Physics : 12.5
- Nature : 40.1
- Nature Physics : 22.8
- Nature Geoscience : 13.9
- New England Journal Medicine : 72.4
- Physical Review Letters : 8.4
- Physical Review E : 2.3
- Plasma Processes and Polymers : 2.8
- Plasma Sources Science and Tech : 3.3
- Proc Nat'l Academy Sciences : 9.6
- Science : 37.2

Impact factor : caution !

- Impact factor
  - cannot be used to compare across disciplines
  - is highly skewed by scoops and controversial articles
  - is moderately correlated with the quality of the results

- High impact factor $\not\Rightarrow$ High quality journal
- High impact factor $\not\Leftarrow$ High quality journal

One last thing...

Non-refereed journals
or low-IF journals
usually are not considered for
promotions or for job applications.

When/what to publish ?

Important questions to ask yourself before writing

- What is your topic of discussion?
- Why is it important?
- How is it related to previous work in the field?
- What is new or different about your contribution?

Careful planning (before writing) will help you save a lot of time.

When to publish ?

- What is the best time to write my article ?

When I have collected all my results ?
When I have the idea ?
When I have finished analysing all the results ?
...

When to publish ?

My study is fully completed

- ***Advantage*** **: results have had time to mature**
- ***Advantage*** **: less risk that someone else will steal my results**
- ***Disadvantage*** **: work may never get published, long article = extra work**

I am still working on my study

- ***Advantage*** **: ideas are still fresh + writing may give new ideas**
- ***Disadvantage*** **: contributes to publication inflation, results may turn out to be wrong by lack of hindsight**

When to publish ?

The best publications generally are those which clearly express

one single,
simple,
novel idea
in an **elegant**
and **pertinent** way.

When to publish ?

KISS = Keep it simple, stupid !

- Focus on one single and strong message
- Avoid cluttering your message with too many results