Geo 892 – 001: Biophysical Models and Applications in Ecosystem Analysis

Feb. 22, 2024

10:00 am – 4:30 pm; GEO 120

- Whatsapp?
- Scientific writing (10:00-11:15 am)
- ET foundations (11:30 am – 1:30 pm), over Pizza lunch (Kevin & Jiquan)
- ET models (1:40 pm – 3:00 pm)
- Study objectives and milestones
- Reading:

1) Chapter 4
2) Monteith, J. L. 1965. Evaporation and environment. *Symposia of the Society for Experimental Biology* 19: 205-234. [PDF]
3) Curtis, O. F. 1926. What is the significance of transpiration? *Science: 63*, 267-271. [PDF]

Schedule (to be revised)

Jan 8 (5-8 pm)

Introduction and setups

Jan 21 (10:00 am – 4:30 pm)

- Scientific writing (10:00-11:15 am)
- ET foundations (11:30 am – 1:30 pm)
- ET models (1:40 pm – 3:00 pm)
- Study objectives and milestones
- Reading: Chapter 4; Monteith 1965; Curtis 1926.

Jan 22 (5-8 pm)

- Biophysical essentials for ecosystem models
- Flux measurement: eddy covariance systems
- Data processing (Dr. Gang Dong)
- Reading: Chapter 1

Feb 4 (10:00 am – 4:30 pm)

- Biophysical essentials for ecosystem models
- Modeling ecosystem production
- Reading: Chapter 2

Feb 5 (5-8 pm)

- Modeling ecosystem production
- Reading: Chapter 2

Mar 10 (10:00 am – 4:30 pm)

- Respiration and carbon loss
- Reading Chapter 3

Apr 1 (9:00 am – 3:30 pm)

Field trip to Battle Creek and KBS (weather dependent)

Apr 7 (10:00 am – 6:00 pm)

- Modeling greenhouse gases
- Reading: Chapter 5; Robertson et al. 20000
- Wrap up: Manuscript completion

All participants provide updates on manuscript development to begin with!

Scientific Writing for Manuscripts

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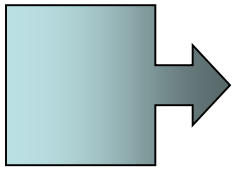
Jan. 22, 2024
Geo892-001

Structure

- Title, Author(s), Affiliations
- Abstract
- Introduction
- Methods
- Results
- Discussion
- Conclusions
- Acknowledgements
- References
- Appendix/supplements
- Links to online information



Results & Discussion

How do you start, proceed, and complete?

- If you have a good story to tell;
- A paper is written for readers, not for yourself;
- Keep it simple stupid (KISS) model;
- Is there any new knowledge or study is unique?
- Who are your audience and what's the appropriate journal?
- Who are your coauthor(s)? (send a written memo, see example at LEES)

Be confident, persistent, and professional!

Have a title, author list, affiliations, target journal, and possibly potential reviewers

- Who has contributed to the study?
- Who should be the corresponding author (again, be very professional)? Keep in mind that the first author will do most of the work!
- Develop a memorandum so that all involved parties agree!
- Ask your coauthors be critical and constructive (i.e., not only raise questions and make suggestions, but also provide solutions).
- Get a copy of the instructions for authors!
- Set up a timetable and deadlines!

An example used in the LEES Lab

Hi all,

Attached is a draft abstract for a potential manuscript, entitled "xxx". The objective of this study is to (concise sentence on study objectives). I am planning to make this my major effort for (timeframe); my hope is to submit it to (*name of journal*) by (date).

I would like to invite you to be a coauthor of this manuscript, given your expertise and knowledge. If you are willing and able to make a **significant intellectual contribution** to this manuscript, please send me an email stating that you would like to be included as coauthor by (date – give people at least 2 weeks to respond). If you are unable to make this deadline or would prefer not to be included as a co-author, please let me know. I look forward to hearing and collaborating with you through this manuscript.

Sincerely

name

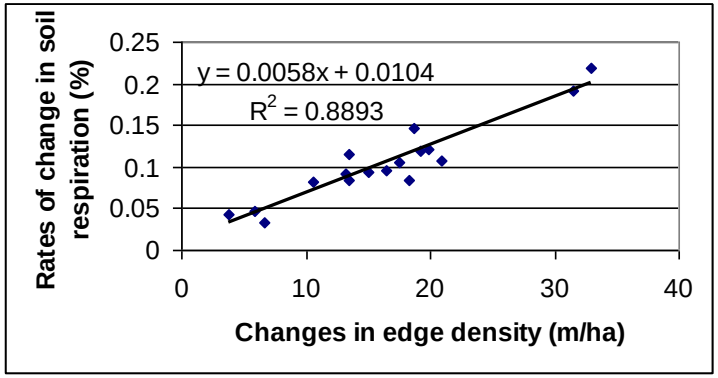
State the study objectives, necessary hypothesis, and justifications.

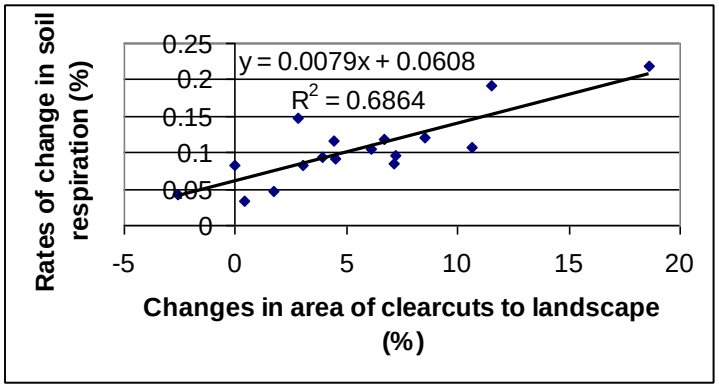
- A list of scientific questions would be of great help!
- This paragraph is usually the last one in the introduction section of a manuscript.
- Statement of attractive, testable hypothesis is a plausible way. Later you can echo your results and discussion.

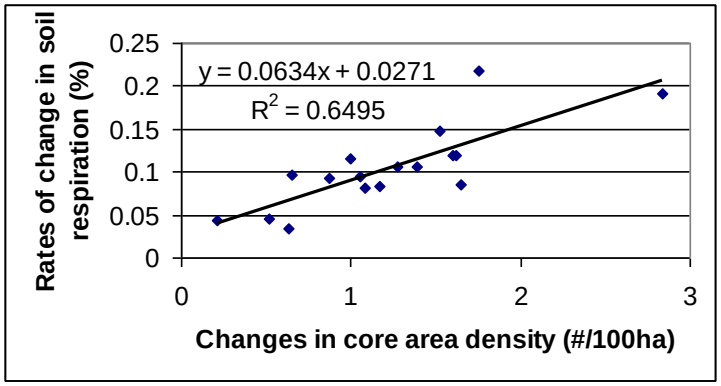
Develop illustrations (figures, tables, photos, etc.)

- Illustrations should be VERY high quality and follow journal requirements (e.g., units, spacing, lines, labeling). You want to impress the reviewers with quality artworks.
- Remember that MORE is not BETTER. I don't recommend to have more than 15 illustrations.
- All illustrations should be synthetic and easy-to-read.
- Eliminate any extra space, duplicated text.

These are NOT acceptable!







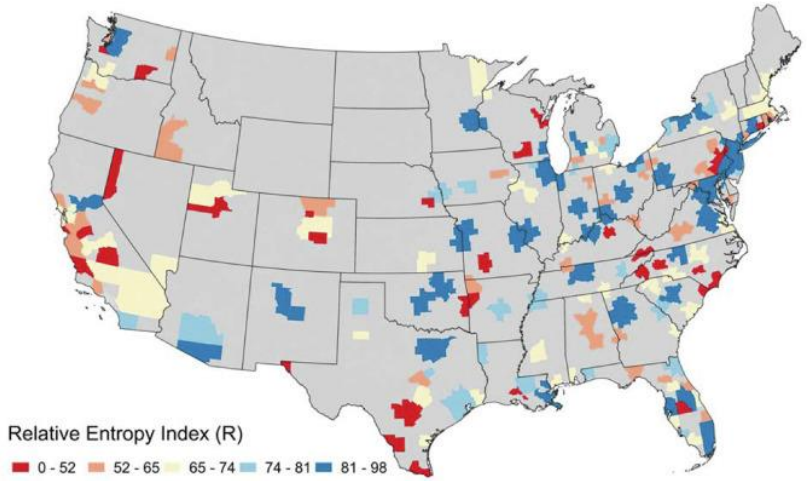


Fig. 3. Intra-metro diversity of clusters (relative entropy index scores per CBSA)

Applied Geography
https://www.sciencedirect.com/science/article/pii/S0143622821001971#fig2

Scale?
N arrow?
Name of the map?
etc.?

Develop illustrations (figures, tables, photos, etc.)

- Figures should be easy-to-read. For example, do not use too many lines in one figure.
- Do not use color unless it's necessary (cost, copy, etc.)
- Do not duplicate in tables and figures.
- Most importantly, a detailed, self explanatory caption is needed. Many readers are lay and do not have time to read your manuscript carefully. S/he should get the messages by reading your figures and captions. This is the place that you should not worry about duplications.

Results: state your scientific discoveries objectively,

i.e., no comments, citation, or speculations!

- Tape your illustrations on the wall (to see) and directly, objectively describe each figure/table.
- Do not cite any reference. If you have any text relating to other studies, move it to the discussion.
- Start a paragraph with a topic sentence (most important) – a comprehensive sentence summarizing the results of the entire paragraph. If a reader can get the messages ONLY by reading the topic sentences of the manuscript, you succeed! (see example later followed by an exercise)
- Make sure your statements are backed by statistics (evidences)!

Topic sentences

Case 1: Figure 2a shows the global spatial pattern for GRI.

Case 2:

RESULTS

To answer these two questions, the 15-day maximum synthesis of Global Inventory Modeling and Mapping Studies normalized difference vegetation index production (GIMMS-NDVI) were used to reproduce growing process of the double season crops (Fig. S2),

Case 3:

Figures 2 presents the change in major transportation tools from 1978–2010.

Note: “Results” are yours, not other published materials

Describe the methods, including study sites, data collection, statistical analysis.

- Your goal is to make sure readers have a complete understanding of the methods.
- Often, one needs go back and forth many times to refine your methods, especially the stats.
- Do not provide any details for widely used methods that one can find in major textbook (e.g., diversity index, NDVI equation, linear regression, R^2, etc.).
- Proper citations are needed following journal requirements.

Discussion

- This is the most difficult section to write.
- Think about
  - what you have discovered
  - why these discoveries are important
  - what are the major points you want to make
  - Are your results supported by the literature
  - What are the implications for science or broader implications (applications)
  - What are the shortfalls or limitations
  - What additional (or future) efforts are needed
- References are heavily used in this section. Please make sure you do not copy published text (i.e., plagiaries).
- Echo your hypotheses
- Additional figure/tables can be used (e.g., literature search)
- Pay attention to TOPIC SENTENCES

Back to introduction

- Assume you have read a lot of relevant papers.
- Begin with the state-of-the-art of science on the topic.
- State what's missing in previous studies (knowledge gaps).
- Cite original papers, not just those from Nature/Science
- What studies are needed on the topic.
- A reviewer will get his/her impression from this section; so make sure you can get reviewers' attention here.
- Again, a paper is written for others, not for yourself.

Conclusions

- What are the take-home messages?
- What do scientific challenges remain?
- Do not exceed 3 paragraphs, 2 are enough, and 1 is the best!
- Do not present a bulletin list
- Do not repeat your results, but synthesis!
- Once completed, back to the abstract.

Abstract

- 1-2 sentences on the knowledge gaps
- Brief description of the methods (often too long!)
- Highlighted major discoveries
- Pitfalls and/or importance/Implications
- Conclusions

Complete references and conduct internal reviews

- Read the instructions very carefully
- Double check citations – references
- Disconnect Endnotes!
- Now you have completed you manuscript, it is very critical for your coauthors and colleagues to review it and provide CONSTRUCTIVE SUGGESTIONS. Ask a favor for an experienced scientist to HAMMER it. It's much better to receive a friendly review.

Structure & Writing Sequence

1) Title, Author(s), Affiliations
2) Objectives (of the introduction)
3) Illustrations (tables/figures)
4) Results
5) Methods
6) Discussion
7) Introduction
8) Conclusions
9) Abstract
10) Acknowledgements
11) References
12) Appendix/supplements
13) Links to online information

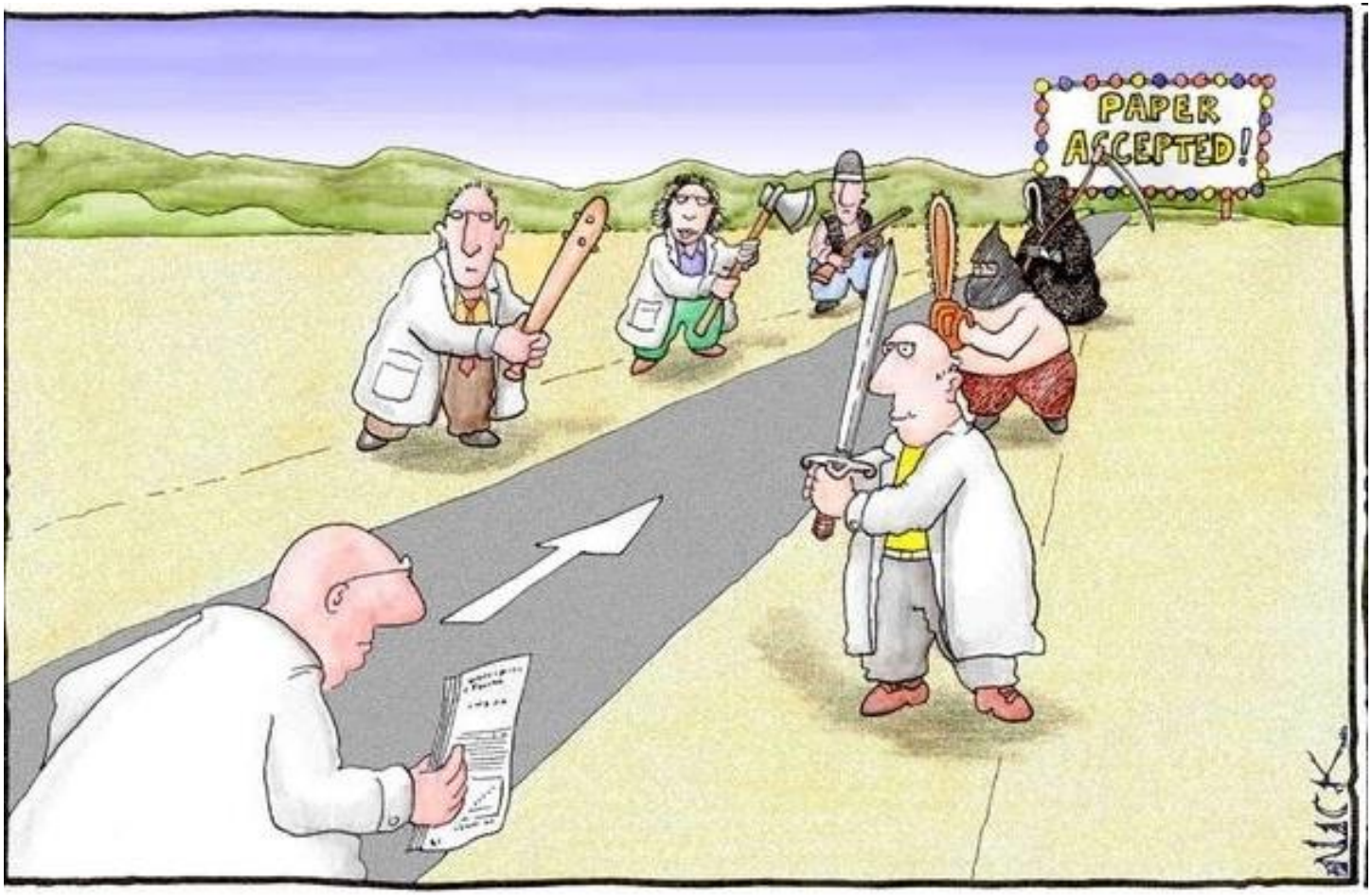
More Tips:

- Watch for parallel structure
- Junior writers pay too much attention to their methods, however LOGIC and PHYLOSOPHY are much more important. THINK, THINK, and THINK!
- What are the take-home messages? Remember our goal?
- Use written languages! Always have someone else to read your manuscript, regardless of English as a second language.
- Take reviews, especially the negative reviews positively. NEVER TAKE IT PERSONALLY!
- Be confident. Good luck to all!

Common Reasons for Rejection

- Poorly written/poor style
- Lack any major new findings (redundant work)
- Descriptive (the tone of writing – music)
- Conclusions unjustified by data/results
- Flawed or poor design methods
- Faulty statistical analysis
- Hypothesis not adequately tested
- Bad luck!

Jiquan's Advice: Be Persistent, Positive, & Strong !



Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

Ethical Issues

- Data manipulation/falsification
- Plagiarism and self-plagiarism
- Conflicts of interest

Before Writing the First Word

- Doing “Inner” Work
- Plagiarism is strictly prohibited!

Focus!

Before Writing the First Word

- Think of the skeleton of writing as order
- Think of the body mass of writing as conciseness
- Think of the muscle tone of writing as vigor

The Skeleton: Constructing a Stable Framework

Consistency

1. Format

2. Terminology (e.g., NEP, NEE, productivity, production, flux, T_{CO2}, etc.)

Vigor: Empowering Your Words

1. SENTENCE TYPE

- Simple vs. complex sentences
- Diversity is the key
- No matter how stimulating your content may be, too many sentences of the same type, the same length, or some combination of the two make for deadly dull writing.

Vigor: Empowering Your Words

2. VERB POWER

- Grammatically-correct vs emptiness
- Dynamics
- Cultural in different disciplines
- Popular words
- ?

Vigor: Empowering Your Words

3. VOICE

- Text is livelier and more informative when written in the active voice (i.e., when the subject of the sentence is the doer of the action of the verb).

- When the sentence is written in the passive voice, the subject is instead the receiver of the action.

Ending: After Writing the Last

2. Improving your prowess as a writer

However, nothing you can do will do more to improve your prowess as a technical writing than to keep on writing!

Serving journals as a reviewer, or editor (learn from others; dynamic writing, etc.