

# Honors Degree Guidelines & Thesis Style Guide

## Department of Earth and Planetary Sciences

### I. Degree Guidelines

The Department of Earth and Planetary Sciences has a long-standing tradition of encouraging undergraduate majors to conduct research projects leading to an honors degree. **Students seeking an honors degree must have a GPA no lower than 3.3 in their Earth and Planetary Sciences courses (counted as those in the Department category of the undergraduate catalog), as well as in their overall university coursework.** Under exceptional circumstances, highly motivated students with lower GPAs may also pursue honors research projects, but they should consult the Director of Undergraduate Studies (DUS) no later than the spring of their junior year before proceeding.

Students are encouraged to approach a faculty advisor to discuss possible projects early in their NU career. **Research projects require extensive time and effort, as such students should formalize a research thesis plan with their faculty advisor no later than the spring of their junior year.** Students and their faculty advisors jointly define a project that may include any combination of field, experimental, and/or computational research. Expectations for the scope of an EARTH thesis are challenging to define due to the diversity of department interests and methodological heterogeneity. However, research is often described as the creation of knowledge, and this should be the philosophical motivation guiding a thesis' development and execution. Examples of thesis-appropriate research include: *(i)* original data collection and analysis, *(ii)* algorithm development, application, and analysis, *(iii)* data synthesis and analysis, and *(iv)* numerical model experimentation and analysis. Review papers, wherein all literature relevant to a particular topic is synthesized and summarized – while valuable scientific contributions – are not considered appropriate for honor's theses. When in doubt regarding the appropriateness of the scope of research for the honors distinction, consult the DUS.

Earth and Planetary Sciences encompasses diverse fields, each offering a range of potential projects. Examples of past projects include: seismological study of deep earthquakes, tectonic modeling of structures on Venus, analysis of seafloor magnetic data, investigation of Ocean Drilling program results, analysis of Neoproterozoic ocean chemistry, examination of global cooling across the Eocene-Oligocene boundary, and geochemical modeling of marine isotope records across Ocean Anoxic Event 2.

**Students seeking honors should take EARTH 399 in advance of their final quarters of study. To receive Honors consideration students must take at least two credits of 399, though only one 399 may count toward EARTH major requirements.** Many students find that more than two credits are required to complete their research. After completing the research, students prepare a written thesis in accord with the Honors Thesis Style Guide that follows these Guidelines. The written thesis will describe the science question/hypothesis, contextualize the research within the published literature, thoroughly describe the methods used to test the hypothesis, relay the experimental results, and discuss the interpretation and context of the results. **To allow adequate time for review, the student must submit the final copy of their thesis to their faculty advisor and the Director of Undergraduate Studies two weeks prior to the WCAS deadline for submission of nominations. Submission is therefore required at the beginning of May to meet the WCAS deadline in mid-May.**

The faculty advisor evaluates the written thesis. Provided the advisor deems the thesis suitable for honors, they write an evaluation of the project and the thesis with a recommendation for honors to the DUS, who chairs the departmental honors committee. The composition of the committee spans different sub-disciplines, ensuring that honors theses are read by faculty from within, as well as outside, the field of study. Committee members evaluate the submitted materials and may add additional comments to the advisor's recommendation, thus providing independent substantive judgment of the student's work. The committee also considers the student's course work and other relevant factors. The DUS compiles input from the committee and other details relevant to the candidate's nomination. This information is filed for two years following review.

Nominations are submitted to the Weinberg College Committee on Undergraduate Academic Excellence for final approval. There is no recourse if the departmental evaluation does not result in nomination. Furthermore, only the Weinberg College Committee on Undergraduate Academic Excellence can confer honors. The evaluation process is competitive, and nomination does not guarantee the award of honors.

Students with questions, including how to choose the most appropriate honors advisor given their interests, should contact the DUS.

## **II. Style Guide**

Organized, consistent, and clear stylistic formatting is a hallmark of written scientific composition. While style conventions and guidelines vary by discipline and journal, the larger purpose is to provide the text and figures in a manner that promotes clarity, reproducibility, and comprehension. All Earth and Planetary Sciences theses to be submitted for Honors consideration should follow the below style specifications and formatting guidelines. **Deviations from the below guidelines are allowed, but should be preapproved by the DUS. An example of an allowable deviation: you plan to submit your thesis to a journal for peer review and the journal's required format is different than that described below.**

### **The Basics:**

- Theses should be submitted in pdf format.
- Theses should use either 11 pt Times New Roman or 10 pt Arial font. A single consistent font should be used throughout the body text. A different font may be used in figures/tables.
- Theses should have 1 inch margins.
- Text in the thesis body (i.e., line spacing) should be consistently spaced at 1.15 or 1.5.
- Pages should be numbered sequentially.
- Theses should use S.I. units (m, s, kg, W, etc.) throughout.
- Units and special characters should be correctly formatted, e.g.,  $\delta_{18}\text{O}$ ,  $\mu\text{m}$ ,  $6.022 \times 10^{23}$ ,  $r_2=0.79$ , etc..
- Proper spelling, grammar, and punctuation are expected. If you need writing assistance outside of your research mentor, please set up a consultation with the [Writing Center](#) and/or the [Writing Place](#).
- Figures, tables, and their attendant captions or headers may appear within the body of the text, or after the References. A full discussion of figure and table formatting can be found below.
- Theses should consist of the following written sections, each described in full below:
  1. Title page
  2. Acknowledgements

3. Abstract
4. Introduction
5. Methods
6. Results
7. Discussion
8. Conclusions
9. References
10. Supplemental Materials / Appendices (optional, i.e., if needed)

- Cite all ideas, concepts, text, or data that are not your own. Uncited work will be considered plagiarized and will be reported to the Weinberg Dean's Office. Weinberg's official policy on academic integrity and plagiarism can be found [here](#). For help in avoiding unintended plagiarism, please consult [Northwestern's guide to Academic Integrity](#).

### **Detailed Style Guidance:**

1. **Title Page:** a single page that identifies the author and provides a descriptive title of the science content. Being creative within scientific confines is encouraged.
  - a. Includes: Title, author, institution, departmental affiliation, date of delivery, email address. indication of research advisor(s) with their institutional affiliation.
2. **Acknowledgements:** This is your opportunity to thank/acknowledge anyone/anything that helped you achieve your thesis goals.

Who/what to acknowledge can include:

- a. Advisor
  - b. Lab manager
  - c. Research group
  - d. Colleague or collaborator
  - e. Those who helped you technically, i.e., provided materials, supplies, data, etc.
  - f. Those who helped you intellectually, i.e., provided assistance, advice, editing, etc.
  - g. Those who supported your research financially, i.e., departmental, college, travel or society grants, etc.
  - h. Family, friends, talisman, etc.
3. **Abstract:** A good abstract explains in one line why the research is important, and then goes on to give a summary of major results, using quantitative descriptors where appropriate. The final sentences explain the major implications of the work. A good abstract is concise, readable, and when appropriate, quantitative.
    - a. Abstracts are often 1 paragraph, and never more than 2 in length (~400 words).
    - b. Abstracts often contain few to no citations.

The Abstract should include answers to the following questions:

- a. What is the science question?
- b. What did you do?

- c. What did you find?
- d. Why does it matter?

4. **Introduction:** The introduction contextualizes the research question presented in the thesis. It elucidates where the research sits within the world at large and within the peer-reviewed literature. It should work to motivate the reader to continue reading the remainder of the document.

The Introduction should include:

- a. A clearly identifiable statement of the goal of the paper: why the study was undertaken, or why the paper was written. The aim/scope statement is often at the end of the Introduction section.
- b. Sufficient background information to allow the reader to understand the context and significance of the question you are trying to address.
  - i. What sort of obstacles have researchers encountered whilst pursuing this research theme?
  - ii. How has the field evolved, such that you are now in a place to ask your science question?
- c. Proper acknowledgement of the previous work on which you are building. Sufficient references such that a reader could achieve a sophisticated understanding of the context and significance of the question.
  - i. The introduction should focus on the thesis question(s). All cited work should be directly relevant to the goals of the thesis. This is not a place to summarize everything you have ever read on a subject.
  - ii. This is not a review paper. Citations should be thesis focused.
- d. A verbal "road map" or "table of contents" guiding the reader to what lies ahead.

5. **Methods:** Science must be reproducible and the methods section should support reproducibility. The Methods should also help to establish the author's scientific acumen and credibility. This is often achieved through formalized and/or quantitative explanation. Supporting citations are expected. Results should not be included in the Methods section.

The Methods section should include:

- a. Information needed to replicate your experiment.
- b. Description of your materials, procedure, or underlying formulae.
- c. Calculations, techniques, procedures, equipment, and calibration.
- d. Limitations, assumptions, and range of validity.
- e. Description of your analytical methods, including reference to any specialized statistical software.
- f. Information to allow the reader to assess the believability of your results.

6. **Results:** The Results section describes your observations and findings, but not your interpretations. Interpretations of results is appropriate in the Discussion section. Present your results as if you are laying out your case before a jury. Present sufficient detail so that others can draw their own inferences and construct their own explanations.

The Results section should include:

- a. Actual statements of observations, including statistics, tables and graphs.
- b. Where appropriate, indicate ranges of uncertainty or confidence intervals.
- c. Mention both negative/null results as well as positive.
- d. Do not interpret results – save that for the discussion.
- e. Break up results into logical segments using subheadings where appropriate.
- f. Key results should be stated in clear sentences at the beginning of paragraphs. It is far better to say "X had significant positive relationship with Y (linear regression  $p < 0.01$ ,  $r^2 = 0.79$ )" then to start with a less informative like "There is a significant relationship between X and Y."

7. **Discussion:** Start with a few sentences that summarize the most important results. This section should be rich in references, particularly those that discuss similar work and/or may be needed to contextualize results and their interpretation. Break up this section into logical segments by using subheads, when appropriate. The discussion section should be a brief essay in itself.

Your Discussion should speak to the following questions and caveats:

- a. What are the major patterns in the observations? (e.g., spatial and/or temporal patterns)
- b. What are the relationships, trends, and generalizations among the results?
- c. What are the exceptions to these patterns and/or generalizations?
- d. What are the likely causes (mechanisms) underlying these patterns?
- e. Is there agreement or disagreement with previous work?
- f. Interpret results in terms of the background laid out in the introduction - what is the relationship of the presented results to the original research question?
- g. What is the implication of the present results for other unanswered questions in earth sciences, ecology, environmental policy, etc.?
- h. Multiple hypotheses: there are usually several possible explanations for results. Be careful to consider all of these rather than simply pushing your favorite. If you can eliminate all but one, that's great, but often that's not possible. Give even treatment to the remaining possibilities, and try to indicate ways in which future work may lead to their discrimination.
- i. Avoid bandwagons: A special case of the above. Avoid jumping to a currently fashionable point of view unless your results strongly support it.
- j. What are the things we now know or understand that we didn't know or understand before the presented results?
- k. Include the evidence or line of reasoning supporting your interpretations.
- l. What is the significance of the present results: why should we care?

8. **Conclusion:** Your conclusion serves a similar function to your abstract, but now your readership is fully informed regarding your results. As such, this section should be similar to the Abstract, but heavier on detail, future directions, and synthesis.

The Conclusion section should include:

- a. What is the strongest and most important statement that you can make from your observations?
- b. If you met the reader at a meeting six months from now, what do you want them to remember about your paper?
- c. Refer back to the problem posed, and describe the conclusions that you reached from carrying out this investigation, summarize new observations, new interpretations, and new insights that have resulted from the present work.
- d. Include the broader implications of your findings.

9. **References:** Cite all ideas, concepts, text, and data that are not your own. If you make a statement, back it up with your own data, or cite a reference. All references listed in the thesis text must have a full entry in the References list. Intra-text and reference list citations should follow [American Geophysical Union Guidelines](#), appended to the end of this document.

10. **Supplemental Materials / Appendices:** This section is optional. If present it can include all text, discussion, maps, data, minutia, etc. that are relevant to your thesis, but not critical to the primary thesis narrative. Items in these sections may be referred to in the main body of your thesis using parenthetical indicators, e.g., (see Appendix 2).

### **Guidelines for Figures, Tables, and their Captions and Headers**

Figures include maps, data plots, pictures, schematics, and other graphical components. Tables are organized numeric and text content, but may include some graphical elements. Multi-part figures may include similar or dissimilar types of elements in distinct panels. Multi-part figures help the reader see the relationships between data series and the components presented, and their layout on the page can reinforce your discussion.

Excellent figures and tables are simple to read. They maximize the space given to presentation of the data, avoid wasted space *within* the figure, and minimize distraction by removing clutter and “ink” on the page. Consider the relationships, distributions, composition, and comparisons within your data in order to determine the type of graphic that is best to use. When in doubt, use the simplest presentation possible for the clearest communication.

All figures must be accompanied by a numbered caption placed below, and all tables must have numbered headers placed above. The captions/headers are to appear on the same page as the figures/tables, and only in the most extreme cases may they appear on the adjacent page where the whole page space is absolutely required for the figure or table.

Formatting of captions/headers must be consistent throughout the document. It is recommended that figure captions and table headers are single line spaced, even when the main text spacing is different. Using bold for the **Figure X** and or **Table Y** along with an indent is a common format.

All figures and tables must be cited in the body text using parenthetical formatting at the point that the reader should refer to them. Unnecessary phrases should be avoided, including: “See Figure X for ....”, “Table Y lists the values of.....”, similar.

*Good:* The Yucatan Peninsula geology has off-lapping consecutively younger formations, from Eocene-Miocene in the interior, out to a 10 km wide Quaternary coastal band overlain by the unconsolidated Holocene beach facies (**Figure 1**).

*Avoid:* You can see in **Figure 1** the geology map of the Yucatan Peninsula which has the older rocks in the middle and younger rocks along the coastline.

You may choose to place figures and tables at the end of the document, or interleaved within the body text. If figures/tables are at the end of the document, order them numerically, first displaying figures, then tables. If figures and tables are interleaved throughout the text, they should appear soon after they are cited in the text. Avoid breaking up paragraphs for the placement of figures and tables.

*A comment on working with graphical elements and captions in Microsoft Word or Google Sheets: The simplest and most effective approach is to place figures and tables using the “in line with text” anchoring format, leaving the margin space on either side blank. This is paired with a single spaced paragraph for the figure caption or the table header. The Microsoft “figure caption” function results in text boxes that jump around, including between pages, and can cause serious issues when converting your document to pdf. You will likely find that fixed and predictable formatting is more functional.*

Figure captions and table headers fully describe the content of the figure/table, and consequently may be long. The “title” of the figure or table can be used as a first declarative statement to begin the caption/header. The caption/header is complimentary to the body text, and unavoidably repetitive of the body text. All citable data, image components, or elements included or utilized in the figure/table must be referenced using parenthetical (Author, date) format. In the case of data tables compiling information from published sources, consider using a column within the table for associated references. Two examples:

**Figure 5.** (a) Graphs of net carbon budget in black with carbon storage in green and carbon export in dashed grey (top), and carbon stock (bottom), at Transect A from June 2015–February 2018. Pink shaded areas indicate model error measured using high and low values for the carbon inventory, wetland age, and shoreline change. (b) Graphs of net carbon budget (top) and carbon stock (bottom) at Transect B from June 2015 – February 2018. No carbon export occurred at Transect B, so the carbon budget line is the same as the carbon storage line.

**Figure 16** **Heaven’s Gate flow record.** Instrumental record from 2001-Apr-01 to 2001-May-27 using an Aanderaa RCM7 Oceanographic flow meter installed at 6.7 m water depth in the flooded cave Heaven’s Gate situation at 5.6 km from the Caribbean coast. **A.** Velocity (m/s). Numbered boxed sections are discussed in the text. **B.** Calica sea level (m asl). **C.** Heaven’s Gate cave water level (m relative). **D.** Barometric pressure (BP; mbar) as observed in Akumal by the Centro Ecológico Akumal (CEA) and daily mean equivalent sea level values for four Caribbean coast meteorological stations (NOAA, 2003). **E.** Specific electrical conductivity (SEC; mS/cm) with five-point centered moving average (thin black line). The thick black line on each panel is the Pertsev filter (Baden et al., 2002b) which shows the de-tided data moving average.

Figures reproduced from other sources must not be manipulated in a way that misrepresents the content to the reader. Any adjustment should be applied equally across the image, such as contrast, brightness, or color. Nonlinear adjustments must be specified in the figure caption.

### **Figure layout and scaling**

- Figures must fit on the 8.5×11 page within the 1” margins, along with the required figure caption or table header on the same page.
- Use portrait orientation. Resort to landscape orientation when absolutely required.
- For multi-part figures, label each parts with bold capital letters -- A, B, C, etc. Where possible, set labels inside the perimeter to conserve space. Use consistent label placement across all parts of a multi-part figure, which is ideally upper left or upper right. Figure parts should be well-delineated, often with white space, a.k.a. gutters.
- Remove all unnecessary lines or graphical elements. Avoid grid lines; if necessary, use thin line width and/or 50% grey. Avoid lines framing the whole figure. Do not use minor tick marks in scales or grid lines. Avoid using y-axis labels on the right that repeat those on the left.
- Legends should be as simple as possible and positioned within the graph panel to avoid needlessly enlarging the figure. Details can be put in the caption.
- Panels should be set close to one another. Do not repeat common axis labels.
- Scales or axes should not extend beyond the range of the data plotted. In multi-part figures, consider using common axis ranges across panels, or maintain the same tick intervals across panels so that the reader can see that there is a scaling difference between panels. Comment in the caption about any changes in scales between panels in support of correct visual reading of the data.

### **Legibility**

- The common font size on figures should be slightly smaller than the body text. Minimum font size of 8 pt, at the sizing on the final page.
- Raster art and pictures should have a minimum 300 dpi at the size presented on the page.
- Use color-blind legible color schemes, e.g., contrasting shades (dark vs. bright/light color) or textures (stippling). Never use red-green combinations.
- When reproducing images that include illegible labels, overprint these with the same information in Photoshop (or similar), or instead present the information in the legend or figure caption.
- When over-writing, use contrasting font colors to the background.

### **Typefaces and labels guidelines for labels on figures and tables:**

- Use a single font within a figure, and between figures. Use a sans-serif font where possible.
- Include properly formatted SI units in parentheses – e.g., Pressure (hPa), Temperature (°C).
- Variables are set in *italics* or as plain Greek letters (e.g., *P*, *T*, *m*). The rest of the text in the figure should be plain text.
- Use leading zeros on all decimals – e.g., 0.3, 0.55.
- Report only significant digits, and use a consistent number of digits between your body text and figures.



## AMERICAN GEOPHYSICAL UNION REFERENCE FORMAT GUIDELINES

This section explains and gives examples of in-text citations and reference list for different media.

AGU follows APA reference style as found in the *Publication Manual of the APA*, Sixth Edition. **Please note that all sources cited in text, tables, and figures must appear in the reference list, and all entries in the reference list must be cited in text.** References that are only cited in supporting information should also be included in the reference list of the paper and cited in text. Data sets that are not newly reported as part of this research should also be cited in the references.

**Text citations.** In-text should be cited using author surname(s) and the date of publication:

“in earlier studies (Johnson, 2009)” or “...as given by Johnson and Smith (2008)” or “In 2012, Johnson and Smith’s study showed that”

Note that author names are not italicized and a comma follows the author name(s) if the reference is enclosed in parentheses. If a multiple-author citation is in the running text, use the word “and”; if in a parenthetical citation, use the ampersand:

Zhu and Zhang (2016) found that...

A subsequent study found that... (Zhu & Zhang, 2016).

For references by three or more authors, use “et al.” after the first author: (Zhang et al., 2005). **Please note, this is a deviation from APA style which lists all author names in works by three to five authors in the first citation in text** and “et al.” in subsequent citations.

- If a parenthetical citation includes two or more papers, separate the citations with a semicolon and list alphabetically by first author name: (Forbes et al., 1999; Hausler & Wu, 2001). **Exception:** You may distinguish a major citation from others by inserting a phrase such as *see also*, before the remaining, which should be in alphabetical order: (Zimecki & Thomas, 2001; see also Jong, 1999; Rembrandt et al., 2007). You may also describe the seminal work outside of parentheses then include more minor contributions at the end of the sentence in parentheses in alpha order.

- If two or more citations by the same author(s) are listed consecutively, they should be combined: (Jones, 1999, 2001; Jones & Tuller, 2003, 2004; Jones et al., 2006, 2008).

- To distinguish two or more papers by the same author(s) published in the same year, add a, b, c, etc. after the year: (Park, 1995a, 1995b; Park et al., 2001a, 2001b, 2001c); the corresponding letter should also appear with the date in the reference list.

- If two or more references of more than three but less than six surnames with the same year, shorten to the same form (e.g., both Jones, Tuller, Park, & Wu, 2013, and Jones, Tuller, Park, Le Pinchon, & Johnson, 2013), shorten to cite the surnames of the first authors and of as many of the subsequent authors as necessary

to distinguish the two references followed by a comma and “et al.”: Jones, Tuller, Park, and Wu (2013) and Jones, Tuller, Park, Le Pinchon, et al. (2013).

- If two or more references from the same year contain the same first six or more authors, use a, b, c, and so on for the in-text citation and in the references list (e.g. Tuller et al., 2016a; Tuller et al., 2016b). This is the case even when the entire author lists are not identical. This is to avoid ambiguity in the in-text citation. See also References list, below.
- If there are different first authors having the same last name, citations should always include the first initials to avoid ambiguity.
- For citations that appear in parentheses, use commas to set off the publication year: (see Figure 3 of Zhu et al., 2013, for linear growth rates).
- Avoid reference citations in the abstract unless dependent on or closely related to another paper (e.g., companion, comment, reply, or commentary on another paper(s)). If included, also include the DOI after the year: (Izett & Fennel, 2018, <https://doi.org/10.1002/2017GB005667>) or Izett and Fennel (2018, <https://doi.org/10.1002/2017GB005667>).

**Reference list.** Reference entries should be ordered alphabetically by the last name of the first author. Follow a strict letter-by-letter alphabetization of the entire last name, ignoring spaces in surnames with multiple words (Lefer before Le Pichon, Vander Linden before van Giessen). When alphabetizing surnames, consider that “nothing precedes something” e.g., Brown before Browning. Other examples: Sanders before St. Amant, MacMillian before McArthur—i.e., alphabetize them literally, not as if they were spelled out.

- All authors’ initials and surnames are given in reverse order; include a comma between surname and initials. Include periods between initials.
- For two to seven authors, use a comma then an ampersand before the final author.
- For eight or more authors, include the first six author names, followed by “et al.”. E.g.: Yao, Q., Brown, P.M., Lui, S., Rocca, M.E., Trouet, V., Zheng, B., et al. (2017)..... **Note: This represents an exception to APA reference style.** AGU’s latex template and APA style in reference management software do not include this exception. You do not need to update your manuscript with this exception; it will be applied by the production vendor during the copy-editing process.
- If two or more references from the same year contain the same first six or more authors, use a, b, c, etc. after the year. This is the case even when the entire author lists are not identical. This is to avoid ambiguity in the in-text citation. See Text Citations section, above, on how to cite in-text.
- A publication date must be given for each reference.
- Note the use of lowercase letters to allow differentiation of text citations of work published in the same year when at least the first six authors are the same.

- The Digital Object Identifier (DOI) is a required part of the citation for AGU journal articles. When they are known, DOIs should be included for non-AGU publications.

List references by the same first author in the following order:

1. First author alone, chronologically (earliest first):
  - Smith, R. (2000a). ....
  - Smith, R. (2000b). ....
  - Smith, R. (2003). ....
2. With one coauthor, alphabetically by coauthor and then earliest first when identical author lists:
  - Smith, R., & Allen, F. A. (2001). ....
  - Smith, R., & Frank, L. A. (1998). ....
  - Smith, R., & Frank, L. A. (2001). ....
3. With two or more coauthors, alphabetically by surname of the second author: Arrange references with the same first author and different second or third authors alphabetically by the surname of the second author or, if the second author is the same, the surname of the third author, and so on. One-author entries precede multiple-author entries:
  - Smith, R. (2016).
  - Smith, R., Allen, F. A., & Baker, T. L. (1999). ....
  - Smith, R., & Roberts, D. H. (2005). ....
  - Smith, R., Roberts, D. H., & Jones, J. (1998). ....
  - Smith, T. (1998). ....

## ELEMENTS AND EXAMPLES OF COMMON REFERENCES

The following explain elements, formatting, and provide examples of the most commonly cited reference types.

### Article in journal

- Authors, publication date, article title, journal, volume, and pages/citation number must be included. Note, there is no period after DOIs.
- Article titles: Use sentence case for article titles, capitalizing the first word of the article title, subtitle, and proper nouns. Do not use quotation marks or italics.
- Periodical/journal titles: Give the entire periodical title—do not abbreviate. Use title case, capitalizing major words and proper nouns. Italicize titles of periodicals.

Author, A. A., Author, B. B., & Author, C. C. (year). Title of article. *Title of Periodical*, xx(x), pp-pp. <https://doi.org/xx.xxxx/xxxxxxx>

Deng, A., & Stauffer, D. R. (2006). On improving 4-km mesoscale model simulations. *Journal of Applied Meteorology and Climatology*, 45(3), 361–381. <https://doi.org/10.1175/JAM2341.1>

- Fang, X., Liemohn, M. W., Nagy, A. F., Luhmann, J. G., & Ma, Y. (2009). On the effect of the Martian crustal magnetic field on atmospheric erosion. *Icarus*. Advance online publication. <https://doi.org/10.1016/j.icarus.2009.01.012>
- Wang, C. (2005). A modeling study of the response of tropical deep convection to the increase of cloud condensational nuclei concentration: 1. Dynamics and microphysics. *Journal of Geophysical Research: Atmospheres*, 110, D21211. <https://doi.org/10.1029/2004JD005720>
- Yum, S. S., & Hudson, J. G. (2002). Maritime/continental microphysical contrasts in stratus. *Tellus, Series B*, 54, 61–73.

### Book and reports

- Authors, publication date, title, publisher's location, and publisher must be included. Include the DOI if one is assigned.
- Book and report titles: Use sentence case, capitalizing the first word of the article title, subtitle, and proper nouns.
- Series titles: Use title case, capitalizing major words, e.g., *Antarctic Research Series*.
- If location includes a U.S. state, do not use periods in state abbreviation.
- To cite an entire edited volume, use the editors as the authors, as shown below.
- If no authors, move the title to the author position. End title with a period.
- Chapter or report titles within volume or series should use non-italics. Volume or series title should be in italics.

de Marsily, G. (1986). *Quantitative hydrogeology: Groundwater hydrology for engineers*. San Diego, CA: Academic.

Klotz, S., & Johnson, N. L. (Eds.). (1983). *Encyclopedia of statistical sciences*, Hoboken, NJ: John Wiley.

Tape, W. (1994). Atmospheric halos. *Antarctic Research Series*. (Vol. 64). Washington, DC: American Geophysical Union.

Moridis, G. J. (1998). *A set of semianalytical solutions for parameter estimation in diffusion cell experiments* (Rep. LBNL-41857). Berkeley, CA: Lawrence Berkeley National Laboratory.

Trask, N. J. (1986). Size and spatial distribution of craters estimated from Ranger photographs. In *Ranger 8 and 9 Analyses and Interpretation* (Technical Report 32-800, pp. 251–260). Pasadena, CA: Jet Propulsion Laboratory.

U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute. (2003). *Managing asthma: A guide for schools* (NIH Publication No. 02-2650). Retrieved from <http://www.nhlbi.nih.gov/health/prof/lung/asthma/asthsch.pdf>

### Chapter in a book

- Authors, publication date, chapter title, editors (preceded by “In”), book title, chapter pages, publisher's location, and publisher.
- If no authors, move the title to the author position. End the title with a period.

- Chapter titles: Use sentence case, capitalizing the first word, first word of a subtitle, and proper nouns. Do not use quotation marks or italics.
- Book or series title: Use title case, capitalizing major words. Use italics.
- Include book series and volume number when applicable.
- Editions, volume numbers, and page numbers should be placed in parentheses after the title.
- If a work has many editors, they may be abbreviated with the first editor, then “et al.”

Langmuir, C. H., Klein, E. M., & Plank, T. (1992). Petrological systematics of mid-ocean ridge basalts: Constraints on melt generation beneath ocean ridges. In J. P. Morgan, D.K. Blackman, J.M. Sinton (Eds.), *Mantle Flow and Melt Generation at Mid-ocean Ridges, Geophysical Monograph Series* (Vol. 71, pp. 183–280). Washington, DC: American Geophysical Union.

Tapley, B. D., & Kim, M.-C. (2001). Applications to geodesy. In L.-L. Fu & A. Cazenave (Eds.), *Satellite Altimetry and Earth Sciences: A Handbook of Techniques and Applications*(pp. 371–406). San Diego, CA: Academic.

Moridis, G. J. (1998). A set of semianalytical solutions for parameter estimation in diffusion cell experiments. (Rep. LBNL-41857). Berkeley, CA: Lawrence Berkeley National Laboratory.

Trask, N. J. (1986). Size and spatial distribution of craters estimated from Ranger photographs. In *Ranger 8 and 9 Analyses and Interpretation* (Tech. Rep. 32-800, pp. 251–260). Pasadena, CA: Jet Propulsion Laboratory.

## Maps

- Authors, publication date, map title, publisher, and publisher’s location should be included.
- If no authors, move the title to the author position. End the title with a period.
- If the map has a number or designator, it should be included (in italics).
- If retrieved online, include the Web address.

Author, A. A. (1998). *Title of Work* (Map No. xxx). Location: Publisher.

Bentor, Y., & Vroman, A. (1959). Arava Valley, with explanatory text. In *The Geological Map of the Negev* (rev. ed., Sheet 19, scale 1:1,000,000). Jerusalem: Government Printer.

Brown, R. J. E. (1967). *Permafrost in Canada*. (Map 1246A). Ottawa, ON: Geological Survey of Canada.

## Thesis

- Authors, publication date, thesis title, degree, institution, and institution’s location must be included. If retrieved from an online repository, include name of database.
- Use sentence case for the title, capitalizing the first word, first word of the subtitle, if any, and proper nouns.

Author, A. A. (2017). *Title of doctoral dissertation or master’s thesis* (Doctoral dissertation or master’s thesis). Retrieved from [Name of Database]. (Accession or Order No. or uri). Location: Institution.

Liu, X. (2017). Surface energy and mass balance model for Greenland Ice Sheet and future projections, (Doctoral dissertation). Retrieved from Deep Blue. (<http://hdl.handle.net/2027.42/137047>). Ann Arbor, MI: University of Michigan.

### **Conference paper**

- Authors, meeting date, title of paper presented, name of meeting (preceded by “paper presented at”), meeting sponsor, and location of meeting are required.
- Conference proceedings published as books or in journals should be formatted accordingly.

Khain, A., Pokrovsky, A., Blahak, U., & Rosenfeld, D. (2008). *Is the dependence of warm and ice precipitation on the aerosol concentration monotonic?* Paper presented at 15th International Conference on Clouds and Precipitation, Cancun, Mexico.

Smith, E. A., Haddad, Z. S., Tanelli, S., & Tripoli, G. J. (2008). *Advancements in NEXRAD in Space (NIS)*. Paper presented at 28th Conference on Hurricanes and Tropical Meteorology, American Meteorological Society, Orlando, FL.