

# Author Guide

Essential information for authors submitting to AGU journals, including instructions for manuscript preparation and formatting, detailed examples for creating the reference list, and an overview of the submission and production processes.

## Manuscript Preparation

Authors are asked to provide manuscripts and artwork as electronic files; please see list of [Acceptable File Formats](#) for more information.

- For LaTeX, use the [AGU template](#). See instructions in the [Formatting Toolkit](#). Do not use `\def` or `\newcommand`, particularly those with # (it is acceptable to use `\ref` and `\label` for figures, tables, and equations and `\cite` commands for reference citations).
- For MS Word, double-space and use 12 pt Times New Roman typeface.
- Use line numbers in submitted manuscript.
- Use English U.S. as the language.
- Indent or space between all paragraphs.
- Do not create math equations or tables as pictures. Use MathType or insert symbols as normal text.

## Manuscript Elements

The manuscript file should be arranged in the following order:

Title page, including authors' names, affiliations, and mailing addresses

Abstract

Text (including appendices and notation)

Acknowledgments

Reference list

Figure captions

Dynamic content captions

Tables

An overview of each manuscript element is given in this guide. A checklist of the most frequently made changes to AGU manuscripts appears at the back of this guide. Interested authors may also download the complete [AGU Grammar and Style Guide](#).

## Title

Titles should be specific, informative, and brief. Title should not be complete sentences. Write out abbreviations.

## Authors

Authors are individuals who have significantly contributed to the research and preparation of the article; all coauthors share responsibility for submitted articles. List each author name separately; a group should not be listed as an author. Groups and other contributors who do not meet the authorship criteria should be appropriately acknowledged in the acknowledgments section. Give the complete mailing address (including postal codes) for all authors. Include the department or laboratory for university affiliations.

## Abstract

The abstract should concisely state the nature of the investigation and summarize the important conclusions. The abstract should be a single paragraph of generally no more than 250 words. Define all abbreviations used in the abstract and avoid including reference citations.

## Text

**Headings.** Except for very short manuscripts (such as comments and replies), the text should be divided into sections, each with its own heading. Sections are numbered with Arabic numerals (1, 2, 3, etc.). A maximum of four levels of heads may be used, with subsections numbered 1.1., 1.2.; 1.1.1., 1.2.1; 1.1.1.1., and so on. A section should contain at least two subsections or none.

**Footnotes.** Incorporate footnoted information into text; footnotes are used only for affiliations and auxiliary material.

**Reference citations.** Use name-date format, not numbered references, and enclose citations in brackets: ...[*Smith et al.*, 2009]... or *Smith et al.* [2009] show...

**Mathematics.** Equations and other mathematics should not be formatted as pictures. Equations are read as part of the flow of a sentence and should be punctuated as such. Displayed equations must be numbered if they will be referred to in text, and the equation number should be placed in parentheses to the right of the equation. Equations in the main body of the text should be numbered consecutively, not by section. Appendix equations should be numbered separately from the body and should begin with the letter of the appendix (e.g., (A1) for the first equation in Appendix A).

- Use italic for variables, bold for vectors and matrices, script for transforms, and sans serif for tensors.
- In Word, use superscripts and subscripts in superior or inferior position; do not use raised and lowered fonts.
- Use the degree symbol ( $^{\circ}$ ) rather than a superscript lowercase “o” or “0”.
- Use  $\exp$  rather than  $e$  if the argument of an exponential is complicated or lengthy.
- Avoid awkward fractional composition by using negative powers.
- Use solidus fractions ( $l/r$ ) in text.
- Use enclosures in the following order to avoid ambiguity: parentheses, brackets, and braces { [ ( ) ] }.

**Notation.** The notation is a list of parameters used in the text and their definitions that should be set up as shown in the following sample. Including a notation section is not mandatory, but all parameters should be defined in the text; thus, a notation section is preferred in a manuscript with heavy use of mathematics.

|     |  |
|-----|--|
| $c$ | rate of soil accumulation, m/yr.                                     |
| $d$ | median grain size of water-deposited material, $\mu\text{m}$ .       |
| $D$ | distance of the locus of points, m.                                  |
| $h$ | elevation of the rock stream channel at a particular time $t_p$ , m. |

## Acknowledgments

Acknowledgments should be limited to collegial and financial assistance. Acknowledgments are not meant to recognize personal or manuscript production support.

## References

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 auxiliary material should not be included in reference list of paper but should be included in a separate reference list in the readme file for the auxiliary material.

**Text citations.** References should be cited in text using author name(s) and the date of publication: for example, “in earlier studies [*Johnson*, 2009]” or “...as given by *Johnson and Smith* [2008].” Note that author names are italicized and that a comma follows the author name(s) in a parenthetical citation.

- For references by three or more authors, use et al. after the first author: [*Zhang et al.*, 2005].
- If a parenthetical citation includes two or more papers, separate the citations with a semicolon: [*Forbes et al.*, 1999; *Hausler and Wu*, 2001].
- If two or more citations by same author(s) are listed consecutively, they should be combined: [*Jones*, 1999, 2001; *Jones and 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.
- Treat authors as people, not books (i.e., do not use “in” before citation); for example, use “shown by *Smith et al.* [2005]” instead “shown in *Smith et al.* [2005]” and “is (are) given by *Smith et al.* [2005]” instead of “can be found in *Smith et al.* [2005].”

**Reference list.** Reference entries should be ordered alphabetically by the last name of the first author; follow strict letter-by-letter alphabetization, e.g., Lefer before Le Pichon and Sanders before St. Amant.

List references by the same first author in the following order: first author alone, chronologically; with one coauthor, alphabetically by coauthor and then chronologically; with two or more coauthors, chronologically only. Alphabetize different first authors having the same last name according to the initials of their first names. Note the use of lowercase letters to allow differentiation of text citations of work published in the same year.

Smith, R. (2000a), ....  
 Smith, R. (2000b), ....  
 Smith, R. (2003), ....  
 Smith, R., and F. A. Allen (2001), ....  
 Smith, R., and L. A. Frank (1998), ....  
 Smith, R., and L. A. Frank (2001), ....  
 Smith, R., and Scientific Shipboard Party (2005)  
 Smith, R., D. H. Roberts, and J. Jones (1998), ....  
 Smith, R., F. A. Allen, and T. L. Baker (1999), ....  
 Smith, T. (1998), ....

Only the first author’s initials and last name are given in reverse order. A publication date must be given for each reference. For an in press article, use the current year as the date.

**DOI.** The Digital Object Identifier (DOI) is a system for identifying and exchanging intellectual property in the digital environment. The DOI is a required part of the citation for AGU journal articles starting in 2002. When they are known, DOIs should be included for non-AGU publications.

The following are 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.

Deng, A., and D. R. Stauffer (2006), On improving 4-km mesoscale model simulations, *J. Appl. Meteorol. Climatol.*, 45(3), 361–381, doi:10.1175/JAM2341.1.

Fang, X., M. W. Liemohn, A. F. Nagy, J. G. Luhmann, and Y. Ma (2009), On the effect of the Martian crustal magnetic field on atmospheric erosion, *Icarus*, doi:10.1016/j.icarus.2009.01.012, in press.

Wang, C. (2005), A modeling study of the response of tropical deep convection to the increase of cloud condensational nuclei concentration: I. Dynamics and microphysics, *J. Geophys. Res.*, *110*, D21211, doi:10.1029/2004JD005720.

Yum, S. S., and J. G. Hudson (2002), Maritime/continental microphysical contrasts in stratus, *Tellus, Ser. B*, *54*, 61–73.

**Book.** Authors, publication date, book title, publisher, and publisher’s location must be included. To cite an entire edited volume, use the editors as the authors, as shown below. Include book series and volume number when applicable.

de Marsily, G. (1986), *Quantitative Hydrogeology: Groundwater Hydrology for Engineers*, Academic, San Diego, Calif.

Klotz, S., and N. L. Johnson (Eds.) (1983), *Encyclopedia of Statistical Sciences*, John Wiley, Hoboken, N. J.

Tape, W. (1994), *Atmospheric Halos, Antarctic Res. Ser.*, vol. 64, AGU, Washington, D. C.

**Chapter in book.** Authors, publication date, chapter title, book title (preceded by “in”), chapter pages, publisher, and publisher’s location must be included. Include editors and book series and volume number when applicable.

Langmuir, C. H., E. M. Klein, and T. Plank (1992), Petrological systematics of mid-ocean ridge basalts: Constraints on melt generation beneath ocean ridges, in *Mantle Flow and Melt Generation at Mid-Ocean Ridges, Geophys. Monogr. Ser.*, vol. 71, edited by J. Phipps Morgan et al., pp. 183–280, AGU, Washington, D. C.

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

**Reports and Maps.** Authors, publication date, report/map title, publisher/sponsor, and publisher’s location must be included. If the report or map has a number/designator, it should be included (given in italics). If a report is not readily available to readers, it should be cited in text only as unpublished material. Chapters in a larger report can be cited as shown below.

Bentor, Y., and A. Vroman (1960), Arava Valley, with explanatory text, in *The Geological Map of the Negev*, rev. ed., sheet 19, scale 1:1,000,000, Isr. Geol. Surv., Jerusalem.

Brown, R. J. E. (1967), Permafrost in Canada, *Map 1246A*, Geol. Surv. of Can., Ottawa, Ont.

Moridis, G. J. (1998), A set of semianalytical solutions for parameter estimation in diffusion cell experiments, *Rep. LBNL-41857*, Lawrence Berkeley Natl. Lab., Berkeley, Calif.

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, Jet Propul. Lab., Pasadena, Calif.

**Thesis.** Authors, publication date, thesis title, thesis designator (including degree), institution, and institution’s location must be included.

Brittle, K. F. (2001), Vibroseis deconvolution: Frequency-domain methods, M.S. thesis, Dep. of Geol. and Geophys., Univ. of Calgary, Calgary, Alberta, Canada.

**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 as those types. When possible, avoid citing conference papers older than 2 years; instead, cite published book or journal articles that resulted from the research presented at the conference.

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

Smith, E. A., Z. S. Haddad, S. Tanelli, and G. J. Tripoli (2008), Advancements in NEXRAD in Space (NIS), paper presented at 28th Conference on Hurricanes and Tropical Meteorology, Am. Meteorol. Soc., Orlando, Fla.

**Eos.** Use *Eos Trans. AGU* as the publication title. Note format for meeting abstracts published in supplements to *Eos*.

Faustini, J. M., P. R. Kaufmann, A. T. Herlihy, and S. G. Paulsen (2009), Assessing stream ecosystem condition in the United States, *Eos Trans. AGU*, 90(36), 309–310.

Nagle, A. N., R. C. Pickle, A. E. Saal, E. H. Hauri, and D. W. Forsyth (2007), Volatiles in basalts from intra-transform spreading centers: Implications for melt migration models, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract DI43A-05.

**Unpublished Material.** Refer to published sources rather than unpublished material whenever possible. References to papers in preparation, preprints, submitted articles, Web sites, and other ephemeral material should appear in text only, not in the reference list. Format as follows.

Integrated with text:

B. L. Smith (unpublished data, 2008)  
available from the U.S. Geological Survey (<http://www.usgs.gov/>)

Parenthetical:

(D. B. G. Collins and R. L. Bras, Climatic and ecological controls of equilibrium drainage density, relief, and channel concavity in drylands, submitted to *Water Resources Research*, 2009)  
(J. G. Jones, manuscript in preparation, 2009)

## Tables

Sample tables edited to AGU style appear at the back of this guide.

**Title.** Every table must have a unique title. Titles should be clear and concise, and they should not be complete sentences. Explanatory information and definitions should be included in a footnote to the title.

**Column heads.** All columns (except the first one) must have headings. Column headings must be arranged so that their relation to the data is clear and they refer to column below.

**Format.** Each entry in a table should appear in a new cell; avoid tables created with the tab key and embedded objects. Tables must be editable and must not be embedded as pictures. Footnotes should be indicated by superscript, lowercase letters.

**Numbering.** Cite each table in numerical order in text. Tables in the main body of the text should be numbered consecutively, not by section. Appendix tables should be numbered separately from the body and should begin with the letter of the appendix (e.g., Table A1 for the first table in Appendix A).

## Figures

Refer to [Acceptable File Formats](#) for accepted formats for submission, publication, and the archive. See the [Guidelines for Preparing Graphics Files](#) for helpful hints for preparing images for publication. See [Figure FAQ](#) for responses to frequently asked questions.

**Format.** Do not include in the figure any information that could easily be included in the caption. Indicate latitude and longitude on maps. Use lowercase letters to label parts of the figure; do not use Arabic or roman numerals. When possible, include the figure label in the top left corner of each plot.

**Captions.** Provide list of captions in manuscript; do not include captions on the figures.

**Numbering.** Cite each figure in numerical order in text. Figures in the main body of the text should be numbered consecutively, not by section. Appendix figures should be numbered separately from the body and should begin with the letter of the appendix (e.g., Figure A1 for the first figure in Appendix A).

**Color and special formats.** Color figures, foldouts, etc., can be accommodated free of charge in the HTML. However, the [costs](#) of including these special features in print must be borne by the author. For additional information, contact the Author Information Help Desk at [author.help@agu.org](mailto:author.help@agu.org).

## Dynamic Content

AGU journals offer many ways to present research that expands beyond the printed page. Movies, animations, downloadable data tables, calculation worksheets, and three-dimensional models allow authors to demonstrate, rather than simply explain, scientific findings. Files must therefore be in [acceptable formats](#) that enable AGU to guarantee long-term accessibility. To learn more about the options, contact [graphics-help@agu.org](mailto:graphics-help@agu.org). In text, dynamic content files are treated in the same way as figures and tables. That is, they should be numbered sequentially (e.g., Animation 1, Animation 2, etc.), be discussed in text in numerical order, and have a corresponding caption describing the content of the dynamic element.

## Supporting Material

Supporting material is limited to data and other materials that are directly related to the main article but are not considered integral to the main conclusions. Any data, animations, figures, etc., that are integral to the main conclusions of the paper should be incorporated into the paper itself rather than as supporting material. See [Guidelines for AGU Auxiliary Materials](#) for help in defining and submitting this material. Contact the Editor's Assistant for more information on this service. Please note that all auxiliary data will be reviewed with your manuscript. Where they exist, AGU encourages authors to submit large data sets to approved data centers for their discipline.

## Copyrighted Material

Authors who use material (e.g., graphics or tables) from another author or copyright holder must obtain written permission to do so. This includes any figures redrawn but basically unaltered or with only slight modifications. Permission must allow for the distribution of the material in any and all media in current and future formats. Obtaining permission can be a lengthy process, so please make sure that you have the necessary permissions before you submit your manuscript to AGU. Permission(s) should accompany the manuscript when submitted. Articles will not be published until permissions are received at AGU.

## Manuscript Submission

When choosing which AGU journal is most appropriate for their submission, authors should consult the journal scopes included at the end of this guide and consult recent issues of their selected journal.

## Submission

AGU uses a completely electronic manuscript submission and peer review system called GEMS: the Geophysical Electronic Manuscript System. All steps in the review process are performed and monitored from GEMS. The system accepts a wide range of file formats and automatically generates a composite PDF file for editors and reviewers (see list of [Acceptable File Formats](#)). In addition, GEMS allows you to check the status of your manuscript online throughout the review process. The GEMS submission process is relatively simple

and quick if you have the necessary information and materials assembled in advance. Make sure to review the GEMS submission guidelines and requirements before you begin your first online submission; a GEMS Quick Guide is provided at the back of this guide. User help is available both online and through the journal Editor's office. (If you are unable to submit your manuscript electronically, contact the journal Editor's Assistant.)

## Review

Authors are asked to provide the names and contact information of five experts in their area as possible reviewers. To avoid a conflict of interest, do not list colleagues who are close associates, collaborators, or family members. The decision to accept a manuscript for publication is made by the journal editor solely on the basis of suitability of subject matter to the focus of the journal, originality of the contribution, and scientific merit. The Editor has complete responsibility and authority to accept or reject a submitted article for publication. The Editor may confer with Associate Editors and reviewers in making this decision. Once the Editor has made a decision on a manuscript, the decision and accompanying reviews are sent via e-mail to the author.

## Manuscript Decision

You will receive word of the Editor's decision on your manuscript via e-mail. If your submission is accepted, this e-mail will contain a series of instructions and links on what to do next to initiate the production process. You will need to decide on color figure options, complete important forms (e.g., copyright transfer), and provide AGU staff with final electronic files in designated formats. It is important to note that the official acceptance date of your manuscript is assigned only when you have provided all final, workable electronic files. AGU staff graphics experts and copy editors will contact you to resolve any technical questions on your files.

## Final Files

Text and table files must be supplied in Microsoft Word, WordPerfect, or LaTeX; PDF text files cannot be used for the production process. Figures and multimedia can be submitted in a variety of formats; consult the list of [Acceptable File Formats](#). Authors who are unable to provide electronic files for text and/or figures should contact the journal editor's assistant. Once the Editor's Assistant has received all your files and essential accompanying information, your manuscript will begin the production process.

## Publications Fees

Many AGU journals rely on voluntary author publication fees to support the broad dissemination of research results that is made possible through moderate subscription rates. Authors who have funding are expected to help support the costs of publication; those who do not may request a reduction or a waiver of fees. Waivers of excess length fees must be approved by the Editor. Authors can easily determine approximate [publication fees](#) before submission by using the [Publication Fee Calculator](#). For more information, contact [pubfees@agu.org](mailto:pubfees@agu.org).

## Article Preparation and Proofing

### Article Preparation

Once all final files and missing information are provided, AGU graphics experts will evaluate and size your figures. If any of your figures do not meet technical specifications, you will be contacted and asked to provide

revised figures. Once the figures pass technical requirements, your final figures and text will be combined into a PDF file that is placed on the journal's Papers in Press page. Papers in Press is a service for subscribers that allows immediate citation and access to accepted manuscripts prior to copyediting and formatting according to AGU style.

Copyediting begins after figures are finalized. Manuscripts are copyedited in the order in which they are accepted for publication, with the exception of rapid publication types, such as correction articles. Copy editors edit the electronic text file, including tables, in the format in which you provide it and make sure that figures match their captions and the text. In addition, copy editors create the critical "metadata" for your article that allows it to be fully linked, searched, and accessed online.

Copy editors will contact you via e-mail to resolve any questions or discrepancies. This reduces the number of changes needed at article proof stage and gives you a chance to make minor last-minute corrections. After queries are answered, copy editors revise the files and send text and figure files to a commercial firm for processing into the three outputs required for electronic publishing: the master source file (XML), the Web version (HTML), and a printer-friendly version (one PDF for the Web and one for the print issue, where applicable).

## Article Proofs

When the proofs are ready, the corresponding author will be contacted via e-mail and asked to proofread both the HTML and PDF versions through a secure Web site. Articles are not fully proofed by staff, so authors are asked to be thorough in their reviews of both the HTML and PDF versions, paying particular attention to mathematics, tables, and graphics. The proof is not a draft; authors should submit only serious corrections that affect the interpretation of the article or correct the data and avoid simple rewording and rephrasing. *Authors will be charged for excessive changes arising from their own errors and omissions.* A list of corrections should be returned via e-mail, and staff will incorporate them into the article files according to AGU style. If figure revisions are requested or new figures supplied during this proofing process, the staff will process them and post them for the corresponding author to review. Extensive or significant changes to the article are subject to Editorial review.

The corrected files are again sent to the commercial firm for reprocessing into final files for the archive, Web, and print. Staff carefully check to make sure that all corrections have been made, that HTML links work, and that the article is properly posted on the journal Web site. The article is now officially published.

## Reprints

Electronic reprints are available for all journals. Authors who honor the corresponding fee receive a user name and password that they can share with colleagues for their personal use. The user name can be used for 200 accesses; each access permits the reader to see both the HTML and the PDF versions of the article.

## Most Frequently Made Changes

The following checklist covers the changes made most frequently to AGU manuscripts. Following this checklist will help speed the processing of your manuscript.

- List all authors on title page and provide complete addresses for all authors
- Use American spellings rather than British spellings
- Incorporate footnoted information into text (footnotes are used only for affiliations and auxiliary material)
- Define abbreviations/acronyms at first use
- Change dates to international date format: 25 January 2003 (in tables, months may be abbreviated)
- Change bulleted lists to numbered lists
- Add space between numeral and unit of measure; do not use a dot
- Number text equations consecutively throughout; do not number by section, except appendix equations, which must be numbered separately from main text equations
- Provide equations that are editable, not formatted as pictures
- Format reference citations to AGU style: use name-date format, not numbered references, and enclose citations in brackets: ...[*Smith et al.*, 2009]... or *Smith et al.* [2009] show...
- Provide complete information for each reference, as outlined above
- Cite all references in the text and provide a reference for each unique text citation
- Provide tables that are editable, not formatted as pictures (note that tables may be submitted in Excel)
- Include at least two points of latitude and longitude on figures containing maps
- LaTeX: Do not use `\newcommands`, particularly ones with # (using `\ref` and `\label` and `\cite` commands for reference citations is acceptable)

## Sample Tables

**Table 1.** Fitted Parameters of the Waxman and Smits Equation Relating Soil Electrical Conductivity and Water Saturation for the Three Soils Investigated in This Study<sup>a</sup>

|                         | $F_{\text{sat}}$ | $n$  | $\sigma_s$<br>(S/m) |
|-------------------------|------------------|------|---------------------|
| Avignon silty clay loam | 5.48             | 5.96 | 0.359               |
| Collias loam            | 4.54             | 1.88 | 0.109               |
| Fontainebleau sand      | 4.62             | 2.58 | 0.036               |

<sup>a</sup>See equation (3).

**Table 2.** Coefficients of Determination for Both Seasons When  $x$  Is the Topographic Index Using Total Periods<sup>a</sup>

| Regression Equations                 | 6–22 Nov 2003 |             | 2–22 May 2004 |             |
|--------------------------------------|---------------|-------------|---------------|-------------|
|                                      | 10 cm         | 30 cm       | 10 cm         | 30 cm       |
| <i>MD8 Surface</i>                   |               |             |               |             |
| Linear                               | 0.13 (0.08)   | 0.35 (0.38) | 0.00 (0.01)   | 0.03 (0.02) |
| Logarithm                            | 0.07 (0.07)   | 0.40 (0.39) | 0.00 (0.02)   | 0.03 (0.02) |
| Exponential                          | 0.12 (0.07)   | 0.34 (0.41) | 0.00 (0.02)   | 0.03 (0.02) |
| Power                                | 0.07 (0.14)   | 0.42 (0.39) | 0.00 (0.04)   | 0.02 (0.02) |
| <i>MD8 Bedrock</i>                   |               |             |               |             |
| Linear                               | 0.20 (0.10)   | 0.49 (0.48) | 0.00 (0.01)   | 0.05 (0.03) |
| Logarithm                            | 0.11 (0.11)   | 0.50 (0.50) | 0.00 (0.00)   | 0.04 (0.04) |
| Exponential                          | 0.18 (0.11)   | 0.45 (0.55) | 0.00 (0.01)   | 0.05 (0.02) |
| Power                                | 0.09 (0.20)   | 0.52 (0.50) | 0.00 (0.03)   | 0.03 (0.04) |
| <i>MD<math>\infty</math> Surface</i> |               |             |               |             |
| Linear                               | 0.04 (0.02)   | 0.43 (0.57) | 0.05 (0.00)   | 0.03 (0.01) |
| Logarithm                            | 0.01 (0.02)   | 0.55 (0.56) | 0.02 (0.00)   | 0.01 (0.01) |
| Exponential                          | 0.03 (0.10)   | 0.42 (0.58) | 0.05 (0.03)   | 0.02 (0.00) |
| Power                                | 0.01 (0.03)   | 0.56 (0.57) | 0.01 (0.10)   | 0.00 (0.02) |
| <i>MD<math>\infty</math> Bedrock</i> |               |             |               |             |
| Linear                               | 0.24 (0.14)   | 0.53 (0.76) | 0.04 (0.00)   | 0.07 (0.02) |
| Logarithm                            | 0.11 (0.09)   | 0.73 (0.75) | 0.01 (0.00)   | 0.02 (0.02) |
| Exponential                          | 0.22 (0.10)   | 0.50 (0.75) | 0.03 (0.00)   | 0.05 (0.02) |
| Power                                | 0.09 (0.23)   | 0.73 (0.74) | 0.01 (0.00)   | 0.01 (0.05) |

<sup>a</sup>Here  $r^2$  represents explained variation divided by total variation between averages of measured and estimated soil moisture using contributing areas for several regression analysis conditions such as computing algorithm, used topography, date, soil depth, and regression models. Linear equation is  $y = ax + b$ , logarithm equation is  $y = a \ln(x) + b$ , exponential equation is  $y = a \exp(bx)$ , and power equation is  $y = ax^b$ , where  $y$  and  $x$  are mean soil moistures and modeled contributing areas and  $a$  and  $b$  are constants for regression models, respectively. Numbers in parentheses are regression analysis.

## GEMS Quick Guide

### Submitting Your Manuscript

1. Register as a GEMS user. Go to the home page of the AGU journal you want to submit to and select the “GEMS” link. Once you have registered, you can submit to any AGU journal using the same username and password.
2. Check file format requirements. You can submit manuscripts in several file formats. Text: Microsoft Word (.doc), LaTeX (.tex), or Portable Document Format (.pdf). Images: EPS is preferred but TIFF files are accepted. For Auxiliary Material such as data sets, animations, and appendices, several file formats can be used. Note that the file format requirements for manuscript submission differ from those for the final accepted manuscript.
3. Log onto the GEMS site. Begin the submission process by clicking the “Submit Manuscript” link from the appropriate GEMS site.
4. Complete the manuscript submission form. Enter author, manuscript, and file information, including abstract text, author contact information, file type and number of files, and AGU Index Terms.
5. Upload files. Enter the file names and location of all files for your submission. This begins the transfer of files from your computer to the GEMS site.
6. Confirm file transfer. Once the files have been transferred, a confirmation screen appears, providing you with a manuscript number and listing the number of files successfully transferred. By selecting “Continue” on this screen, the conversion of these files into PDFs begins.
7. Approve file conversion. Confirm that each of your files was converted successfully. You can Add, Replace, or Delete files at this stage. When you are satisfied that all files are correct, click “Approve Converted Files.” Once your electronic submission has been confirmed by the journal editor’s office, you will be sent an e-mail notification.

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## Journal Scopes

**Geochemistry, Geophysics, Geosystems** ( $G^3$ ) is an electronic journal that publishes research papers on the chemistry, physics, and biology of Earth and planetary processes. Interdisciplinary papers are especially encouraged.  $G^3$  seeks original scientific contributions pertaining to understanding the Earth as a system, including observational, experimental, and theoretical investigations of the solid Earth, hydrosphere, atmosphere, and biosphere at all spatial and temporal scales.  $G^3$  strives to be at the cutting edge of electronic publishing by encouraging the innovative use of data analysis and visualization formats. Published by AGU and the Geochemical Society.

**Geophysical Research Letters** (GRL) publishes short, concise research letters that present scientific advances that are likely to have immediate influence on the research of other investigators. GRL letters can focus on a specific discipline or apply broadly to the geophysical science community.

**Global Biogeochemical Cycles** includes papers in the broad areas of global change involving the geosphere and biosphere. The journal focuses on research at large geographic scales. Marine, hydrologic, atmospheric, extraterrestrial, geologic, biologic, and human causes of and response to environmental change on time scales of tens, thousands, and millions of years are the purview of the journal.

**Journal of Geophysical Research (JGR)** publishes original scientific research on the physical, chemical, and biological processes that contribute to the understanding of the Earth, Sun, and solar system and all of their environments and components. JGR is currently organized into seven disciplinary sections (Atmospheres, Biogeosciences, Earth Surface, Oceans, Planets, Solid Earth, Space Physics). Sections may be added or combined in response to changes in the science.

- **JGR-Atmospheres** includes physics and chemistry of the atmosphere, as well as the atmospheric-biospheric, lithospheric, and hydrospheric interface.
- **JGR-Biogeosciences** focuses on biogeosciences of the Earth system in the past, present, and future and the extension of this research to planetary studies. The emerging field of biogeosciences spans the intellectual interface between biology and the geosciences and attempts to understand the functions of the Earth system across multiple spatial and temporal scales. Studies in biogeosciences may use multiple lines of evidence drawn from diverse fields to gain a holistic understanding of terrestrial, freshwater, and marine ecosystems and extreme environments. Specific topics within the scope of the section include process-based theoretical, experimental, and field studies of biogeochemistry, biogeophysics; atmosphere-, land-, and ocean-ecosystem interactions; biomineralization; life in extreme environments; astrobiology; microbial processes; geomicrobiology; and evolutionary geobiology.
- **JGR-Earth Surface** focuses on the physical, chemical, and biological processes that affect the form and function of the surface of the solid Earth over all temporal and spatial scales, including fluvial, eolian, and coastal sediment transport; hillslope mass movements; glacial and periglacial activity; weathering and pedogenesis; and surface manifestations of volcanism and tectonism.
- **JGR-Oceans** covers physical, biological, and chemical oceanography.
- **JGR-Planets** covers the geology, geophysics, geochemistry, atmospheres, biology, and dynamics of the planets, satellites, asteroids, rings, comets, and meteorites; planetary origins; and planetary detection. Studies of the Earth are included when they concern exogenic effects or the comparison of the Earth to other planets.
- **JGR-Solid Earth** focuses on the physics and chemistry of the solid Earth and the liquid core of the Earth, geomagnetism, paleomagnetism, marine geology/geophysics, chemistry and physics of minerals, rocks, volcanology, seismology, geodesy, gravity, and tectonophysics.
- **JGR-Space Physics** covers aeronomy and magnetospheric physics, planetary atmospheres and magnetospheres, interplanetary and external solar physics, cosmic rays, and heliospheric physics.

**Paleoceanography** focuses on original contributions dealing with reconstructions of past conditions and processes of change as recorded in sediments deposited in water. This especially includes marine sediments but may extend to sediments from freshwater environments. Approaches to past reconstruction might include sedimentology, geochemistry, paleontology, oceanography, geophysics, and modeling. Contributions will emphasize global and regional aspects, rather than purely local interests, and can cover all ages (Precambrian to the Quaternary, including modern analogs).

**Radio Science** carries original scientific contributions on all aspects of electromagnetic phenomena related to physical problems. This journal covers the propagation through and interaction of electromagnetic waves with geophysical media, biological media, plasmas, and man-made structures. Coverage includes, but is not limited to, the application of electromagnetic techniques to remote sensing of the Earth and its environment, telecommunications, signals and systems, the ionosphere, and radio astronomy. All frequencies (including optical) are considered.

**Reviews of Geophysics** provides an overview of geophysics and the directions in which it is going and serves as an integrating force in geophysics. Authorship is by invitation, but suggestions from readers and potential authors are welcome. *Reviews of Geophysics* distills and places in perspective previous scientific work in currently active subject areas of geophysics. Contributions evaluate overall progress in the field and cover all disciplines embraced by AGU.

**Space Weather: The International Journal of Research and Applications** is an online publication devoted to the emerging field of space weather and its impact on technical systems, including telecommunications, electric power, and satellite navigation. The goal is to be a research as well as news and information resource for space weather professionals. *Space Weather* publishes peer-reviewed articles presenting the latest engineering and science research in the field, including studies of the response of technical systems to specific space weather events, predictions of detrimental space weather impacts, and effects of natural radiation on aerospace systems; news and feature articles providing up-to-date coverage of government agency initiatives worldwide and space weather activities of the commercial sector; letters and opinion articles offering an exchange of ideas; and editorial comments on current issues facing the community.

**Tectonics** contains original scientific contributions in analytical, synthetic, and integrative tectonics. Papers are restricted to the structure and evolution of the terrestrial lithosphere with dominant emphasis on the continents. *Tectonics* is joint publication of AGU and the European Geosciences Union.

**Water Resources Research** is an interdisciplinary journal integrating research in the social and natural sciences of water. It contains original contributions in hydrology; in the physical, chemical, and biological sciences; and in the social and policy sciences, including economics, systems analysis, sociology, and law.

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