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**Allison Author1, B.B. Author2, and Charles T. Author1**

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*2Author affiliation, including department, institution, and full mailing address*

**ABSTRACT**

Abstract should be about 250 words long.

**INTRODUCTION [FIRST LEVEL HEADING]**

**This is a Second Level Heading**

***This is a Third Level Heading***

***This is a fourth level heading.*** It runs into the paragraph.

*This is a fifth level heading.* It also runs into the paragraph. Equations should be formatted as follows:

E = mc2. (1)

If your equation is in the middle of a paragraph, the line after the equation should be flush left (not indented). Use a period after the equation if it is at the end of a sentence. If your equation is in the middle of a sentence, use a comma after the equation. All equations that do not run into the text should be numbered as above.

This is a sample in-text citation (Taylor, 1990; Sawyer et al., 1991; Kane and Neuzil, 1993). Note the commas preceding and following the year, as well as the semicolon separating references. In-text citations also can follow the example of Rogers (1996, p. 154 [page numbers are only required if a direct quotation is used]).

**APPENDIX**

Paragraphs in an Appendix don’t need to be indented.

**ACKNOWLEDGMENTS**

**REFERENCES CITED**

[Following is a list of common reference types, formatted properly (preferred format in blue, followed by examples). You will not, of course, include the section headers (Abstract, Book, Journal, etc.) in your References Cited. References should be in alphabetical order, and all should be cited in your manuscript. References cited only in your Supplemental Material should be included in your Supplemental Material file and not in the main text. If you know a paper’s DOI number, please include it. Do not cite papers that are unpublished, in preparation, submitted, in review, or in revision. If a reference has not been formally accepted, cite it in the text only as a personal communication along with the year of your direct communication with the researcher/author.]

# *Abstract*

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*From other sources:* Author surname, Author first initial(s), Year, Abstract title: Publication name, v. #, (issue) no. #, p. #–# [language notes (if applicable)].

Fitzgerald, P.G., 1989, Uplift and formation of Transantarctic Mountains: Applications of apatite fission track analysis to tectonic problems: International Geological Congress, 28th, Washington, D.C., Abstracts, v. 1, p. 491.

McKinnon, W.B., and Schenk, P.M., 2000, Chaos on Io: A model for formation of mountain blocks by crustal heating, melting, and tilting: Houston, Texas, Lunar and Planetary Institute, Lunar and Planetary Science XXXI, CD-ROM, abstract 2079.

Reusch, D.B., Karmosky, C.C., Lampkin, D.J., and Schneider, D.P., 2013, Will a warmer west Antarctic also bring a wetter ice sheet?: Abstract C21E-07 presented at 2013 Fall Meeting, AGU, San Francisco, California, 9–13 December.

Sears, J.W., 2012, Making Nuna and breaking Rodinia: Implications of Siberia-Laurentia connections for supercontinent cycles: Geological Society of America Abstracts with Programs, v. 44, no. 7, p. 378.

*[Note: Beginning with volume 21 (1989),* Geological Society of America Abstracts with Programs *started numbering the pages of each Section Meeting book and the Annual Meeting book separately (not sequentially). Therefore, issue numbers should be included starting with volume 21 but are not applicable for years before that. Beginning in 2016, GSA ceased printing its* Abstracts *volumes, so there are no page numbers, but there are volume, issue, and DOI numbers.]*

# *Book*

Author surname, Author first initial(s), Year, Book title: Publisher location, Publisher name and type of publication (if applicable) v# (if applicable), # p., DOI [language notes (if applicable)].

Allmendinger, R.W., Cardozo, N., and Fisher, D., 2011, Structural Geology Algorithms: Vectors and Tensors in Structural Geology: New York, Cambridge University Press, 304 p.

Burchfiel, B.C., Chen Zhiliang, Hodges, K.V., Liu Yuping, Royden, L.H., Deng Changrong, and Xu Jiene, 1992, The South Tibetan Detachment System, Himalayan Orogen: Extension Contemporaneous with and Parallel to Shortening in a Collisional Mountain Belt: Geological Society of America Special Paper 269, 41 p., https://doi.org/10.1130/SPE269.

Coffin, M.F., Frey, F.A., Wallace, P.J., et al., 2000, Proceedings of the Ocean Drilling Program, Initial reports, Volume 183: College Station, Texas, Ocean Drilling Program, CD-ROM. *[Instance above is an exception to GSA style. Include names of co-chief scientists; additional names may be substituted with “et al.”]*

Hatcher, R.D., Jr., Carlson, M.P., McBride, J.H., and Martínez Catalán, J.R., eds., 2007, 4-D Framework of Continental Crust: Geological Society of America Memoir 200, 632 p., https://doi.org/10.1130/MEM200.

Vogt, P., and Tucholke, B., eds., 1986, The Western North Atlantic Region: Boulder, Colorado, Geological Society of America, Geology of North America, v. M, 696 p., 11 pl., https://doi.org/10.1130/DNAG-GNA-M.

# *Chapter in a Book/Paper in a Multiauthor Volume*

Author surname, Author first initial(s), Year, Chapter title, *in* Editor surname, Editor given name initial(s), ed(s)., Book Title: Publisher location, Publisher Name and series (if applicable) v# (if applicable), p. #–#, DOI [language notes (if applicable)].

Elburg, M.A., Smet, I., and De Pelsmaeker, E., 2014, Influence of source materials and fractionating assemblage on magmatism along the Aegean Arc, and implications for crustal growth, *in* Gómez-Tuena, A., Straub, S.M., and Zellmer, G.F., eds., Orogenic Andesites and Crustal Growth: Geological Society, London, Special Publication 385, p. 137–160, https://doi.org/10.1144/SP385.1.

Sawyer, D.S., Buffler, R.T., and Pilger, R.H., 1991, The crust under the Gulf of Mexico basin, *in* Salvador, A., ed., The Gulf of Mexico Basin: Boulder, Colorado, Geological Society of America, Geology of North America, v. J, p. 53–72, https://doi.org/10.1130/DNAG-GNA-J.53.

Shipboard Scientific Party, 1987, Site 612, *in* Poag, C.W., Watts, A.B., et al., Initial Reports of the Deep Sea Drilling Project, Volume 95: Washington, D.C., U.S. Government Printing Office, p. 31–153.

Taylor, J.C.M., 1990, Upper Permian—Zechstein, *in* Glennie, K.W., ed., Introduction to the Petroleum Geology of the North Sea (third edition): Oxford, UK, Blackwell, p. 153–190.

# *Comment, Discussion, Reply*

Author surname, Author first initial(s), Year, Title of Comment/Discussion thread/Reply: Comment/Discussion/Thread: Publication name, v. #, p. #–#, DOI [language notes (if applicable)].

Retallack, G.J., 1993, Classification of paleosols: Discussion: Geological Society of America Bulletin, v. 105, p. 1635–1636, https://doi.org/10.1130/0016-7606(1993)105<1635:COPDAR>2.3.CO;2.

Retallack, G.J., 2014, How well do fossil assemblages of the Ediacara Biota tell time?: Comment: Geology, v. 42, p. e332, https://doi.org/10.1130/G34781C.1. *[Modern example with e page number.]*

Saltzman, M.R., 2001, Earliest Carboniferous cooling step triggered by the Antler orogeny?: Reply: Geology, v. 29, p. 93, https://doi.org/10.1130/0091-7613(2001)029<0093:R>2.0.CO;2.

# *Computer Program*

Author surname, Author first initial(s) OR Authoring Organization, Year, Program title/name: Program creator(s), version, URL.

Lahr, J.C., 1999, HYPOELLIPSE: A computer program for determining local earthquake hypocentral parameters, magnitude, and first-motion pattern: U.S. Geological Survey Open-File Report 99-23, version 1.1, https://pubs.usgs.gov/of/1999/ofr-99-0023/.

Lindquist, W.B., Lee, S.M., Oh, W., Venkatarangan, A.B., Shin, H., and Prodanovic, M., 2005, 3DMA-Rock: A software package for automated analysis of rock pore structure in 3-D computed microtomography images: Department of Applied Mathematics and Statistics, State University of New York, Stony Brook, [http://www.ams.sunysb.edu/~lindquis/3dma/3dma\_rock/3d ma](http://www.ams.sunysb.edu/~lindquis/3dma/3dma_rock/3dma)\_rock.html.

# *Database*

Author surname, Author first initial(s) OR Authoring Organization, Year, Database title: Database host, URL (date last accessed).

Schweitzer, P.N., 1993, Modern average global sea-surface temperature: U.S. Geological Survey Digital Data Series DDS-10.

U.S. Geological Survey, 2006, Quaternary fault and fold database for the United States:[*https://www.usgs.gov/natural-hazards/earthquake-hazards/faults*](https://www.usgs.gov/natural-hazards/earthquake-hazards/faults) (accessed June 2012).

Wentworth, C.M., Fisher, G.R., Levine, P., and Jachens, R.C., 1995, revised 2007, The surface of crystalline basement, Great Valley and Sierra Nevada, California: A digital map database: U.S. Geological Survey Open-File Report 95-96, v. 1.1, 18 p. and database (available at<http://pubs.usgs.gov/of/1995/96/>[).](http://pubs.usgs.gov/of/1995/96/))

# *Guidebook*

*Full Book:* Author surname, Author first initial(s), Year, Guidebook title: Publisher name Book type volume number, # p., DOI [language notes (if applicable)].

*Chapter in Book:* Author surname, Author first initial(s), Year, Chapter title, *in* Editor surname, Editor first initial(s), ed(s)., Guidebook title: Publisher name Book type or Series name volume number, p. #–#, DOI [language notes (if applicable)].

Aslan, A., Karlstrom, K.E., Crossey, L.J., Kelley, S., Cole, R., Lazear, G., and Darling, A., 2010, Late Cenozoic evolution of the Colorado Rockies: Evidence for Neogene uplift and drainage integration, *in* Morgan, L.A., and Quane, S.L., eds., Through the Generations: Geologic and Anthropogenic Field Excursions in the Rocky Mountains from Modern to Ancient: Geological Society of America Field Guide 18, p. 21–54, https://doi.org/10.1130/2010.0018(02).

Barton, C.C., and Hsieh, P.A., 1989, Physical and hydrologic-flow properties of fractures, *in* International Geological Congress, 28th, Field Trip Guidebook T385: Washington, D.C., American Geophysical Union, 36 p.

Blackstone, D.L., Jr., 1990, Rocky Mountain foreland exemplified by the Owl Creek Mountains, Bridger Range and Casper Arch, central Wyoming*, in* Specht, R., ed., Wyoming Sedimentation and Tectonics: Wyoming Geological Association, 41st Annual Field Conference, Guidebook, p. 151–166.

# *Journal Article*

Author surname, Author first initial(s), Year, Article title: Journal title, v. #, (issue) no. #, p. #–# (or article number), DOI [language notes (if applicable)].

Arias, O., and Denyer, P., 1991, Estructura geológica de la región comprendida en las hojas topográficas Abras, Caraigres, Candelaria y Río Grande, Costa Rica: Revista Geológica de América Central, no. 12, p. 61–74.

Balco, G., Stone, J.O., and Mason, J.A., 2005, Numerical ages for Plio-Pleistocene glacial sediment sequences by 26Al/10Be dating of quartz in buried paleosols: Earth and Planetary Science Letters, v. 232, p. 179–191, https://doi.org/10.1016/j.epsl.2004.12.013.

Brown, J.R., Beroza, G.C., Ide, S., Ohta, K., and Shelly, D.R., 2009, Deep low-frequency earthquakes in tremor localize to the plate interface in multiple subduction zones: Geophysical Research Letters, v. 36, L19306, https://doi.org/10.1029/2009GL040027.

Coogan, L.A., and Hinton, R.W., 2006, Do the trace element compositions of detrital zircons require Hadean continental crust?: Geology, v. 34, p. 633–636, https://doi.org/10.1130/G22737.1.

Newell, A.J., Sennikov, A.G., Benton, M.J., Molostovskaya, I.I., Golubev, V.K., Minikh, A.V., and Minikh, M.G., 2010, Disruption of playa–lacustrine depositional systems at the Permo-Triassic boundary: Evidence from Vyazniki and Gorokhovets on the Russian Platform: Journal of the Geological Society, v. 167, p. 695–716, https://doi.org/10.1144/0016- 76492009-103.

Varnavskiy, V.G., Kirillova, G.L., Krapiventseva, V.V., and Kuznetsov, V.Y., 1995, Deltaic complexes of the sedimentary basins (far northeast) [translated from Litologo- petrofizicheskiye kriterii neftegazonosnosti: Moscow, Nauka, 1990, p. 127–137]: Petroleum Geology, v. 29, p. 54–66.

Walter, L.M., Bischof, S.A., Patterson, W.P., and Lyons, T.L., 1993, Dissolution and recrystallization in modern shelf carbonates: Evidence from pore water and solid phase chemistry: Royal Society of London Philosophical Transactions, ser. A, v. 344, p. 27–36, <https://doi.org/10.1098/rsta.1993.0072>.

***In Press*** *[Manuscript has been formally accepted, but not published.]*

Thomson, O.A., Cavosie, A.J., Moser, D.E., Barker, I., Radovan, H.A., and French, B.M., 2014, Preservation of detrital shocked minerals derived from the 1.85 Ga Sudbury impact structure in modern alluvium and Holocene glacial deposits: Geological Society of America Bulletin, https://doi.org/10.1130/B30958.1 (in press). *[Include DOI number if available.]*

# *Map*

Author surname, Author first initial(s), Year, Map Title: Publisher name and map number (if applicable), scale 1:###, # sheet(s)/plate(s), # of text pages, DOI/URL.

Bayley, R.W., and Muehlberger, W.R., compilers, 1968, Basement rock map of the United States, exclusive of Alaska and Hawaii: U.S. Geological Survey, scale 1:2,500,000, 2 sheets.

Bedford, D.R., Miller, D.M., and Phelps, G.A., 2010, Surficial geologic map of the Amboy 30′ × 60′ quadrangle, San Bernardino County, California: U.S. Geological Survey Scientific Investigations Map 1309, scale 1:100,000.

Ernst, W.G., 1993, Geology of the Pacheco Pass quadrangle, central California Coast Ranges: Geological Society of America Map and Chart Series MCH078, scale 1:24,000, 1 sheet, 12 p. text.

Guth, A., 2014, Maps of the Southern Kenya Rift: Geological Society of America Digital Map and Chart Series DMCH016, 6 PDFs[, https://www.geosociety.org/maps/2014-](http://www.geosociety.org/maps/2014-) DMCH016/.

Long, S.P., Henry, C.D., Muntean, J.H., Edmondo, G.P., and Thomas, R.D., 2012, Preliminary geologic map of the southern Eureka mining district, Eureka and White Pine Counties, Nevada: Nevada Bureau of Mines and Geology Open-File Report 12-6, scale 1:24,000.

# *Online PDF*

Author surname, Author first initial(s) OR Authoring Organization, Year, Document title: URL (date last accessed [Month Year]).

Bureau of Land Management, 2010, Plan amendment/final EIS for the Genesis Solar Energy Project, Vol. 1: [https://energy.gov/sites/prod/files/nepapub/nepa\_documents/Re](http://energy.gov/sites/prod/files/nepapub/nepa_documents/Re) dDont/EIS-0455-FEIS-01-2010.pdf (accessed March 2014).

# *Open-File Report*

Author surname, Author first initial(s), Year, Report title: Publisher name Report type report number, total pages, DOI.

Choquette, A.F., 2014, Pesticides and nitrate in groundwater underlying citrus croplands, Lake Wales Ridge, central Florida, 1999–2005: U.S. Geological Survey Open-File Report 2013-1271, 35 p., [https://pubs.usgs.gov/of/2013/1271/pdf/of2013-1271.pdf.](http://pubs.usgs.gov/of/2013/1271/pdf/of2013-1271.pdf)

Lotspeich, R.R., 2007, The quality of water and bottom material in Lunga Reservoir, Virginia, September 2004 through August 2005: U.S. Geological Survey Open-File Report 2007-1053, 52 p., https://pubs.usgs.gov/publication/ofr20071053.

Wilson, A.B., 2001, Compilation of various geologic time scales:U.S. Geological Survey Open-File Report 01-0052,<https://doi.org/10.3133/ofr0152> (accessed May 2024).

***Paper in a Government or University Serial Publication***

Author surname, Author first initial(s), Year, Paper title: Publisher name paper type (or series) publication number, p. #–#, URL.

Hay, R.L., 1963, Stratigraphy and zeolitic diagenesis of the John Day Formation of Oregon: University of California Publications in Geological Sciences, v. 42, p. 199–262.

Smith, D.C., Fox, C., Craig, B., and Bridges, A.E., 1989, A contribution to the earthquake history of Maine*, in* Anderson, W.A., and Borns, H.W., Jr., eds., Neotectonics of Maine: Maine Geological Survey Bulletin 40, p. 139–148.

Willingham, C.R., Rietman, J.D., Heck, R.G., and Lettis, W.R., 2013, Characterization of the Hosgri Fault Zone and adjacent structures in the offshore Santa Maria Basin, south-central California: Chapter CC of Evolution of Sedimentary Basins/Onshore Oil and Gas Investigations–Santa Maria Province: U.S. Geological Survey Bulletin 1995-CC, 105 p., [https://pubs.usgs.gov/bul/1995/cc/pdf/bul1995cc.pdf.](http://pubs.usgs.gov/bul/1995/cc/pdf/bul1995cc.pdf)

Yager, R.M., 1993, Estimation of hydraulic conductivity of a riverbed and aquifer system on the Susquehanna River in Broome County, New York: U.S. Geological Survey Water-Supply Paper 2387, 49 p., <https://doi.org/10.3133/wsp2387>.

# Proceedings from a Symposium or Conference

Author surname, Author first initial(s), Year, Title, *in* Proceedings, Conference/Symposium title, Conference/Symposium number: Location, Date(s), Conference/Symposium host, v. #, (issue) no. #, p. #–#, DOI.

*[Include year of conference if it differs from publication year.]*

Baar, C., 1972, Creep measured in deep potash mines vs. theoretical predictions, *in* Proceedings, Canadian Rock Mechanics Symposium, 7th, Edmonton: Ottawa, Canada Department of Energy, Mines and Resources, p. 23–77.

MacLeod, N.S., Walker, G.W., and McKee, E.H., 1976, Geothermal significance of eastward increase in age of upper Cenozoic rhyolitic domes in southeastern Oregon, *in* Proceedings, Second United Nations Symposium on the Development and Use of Geothermal Resources, San Francisco, May 1975, Volume 1: Washington, D.C., U.S. Government Printing Office (Lawrence Berkeley Laboratory, University of California), p. 465–474.

Wang, Y., Forsyth, D.W., Rau, C.J., Carriero, N., Schmandt, B., Gaherty, J.B., and Savage, B., 2013, Fossil slabs attached to unsubducted fragments of the Farallon plate: Proceedings of the National Academy of Sciences of the United States of America, v. 110, no. 14, p. 5342–5346, https://doi.org/10.1073/pnas.1214880110.

# *Thesis/Dissertation*

Author surname, Author first initial(s), Year, Thesis/Dissertation title [thesis type (e.g., Master’s thesis, Ph.D. dissertation, etc.)]: City of university, University name, total pages [language notes (if applicable)].

Wopat, M.A., 1990, Quaternary alkaline volcanism and tectonics in the Mexican Volcanic Belt near Tequila, Jalisco, southwestern Mexico [Ph.D. thesis]: Berkeley, University of California, 277 p.

# *Website*

Author surname, Author first initial(s), Year, Website title: URL (date last accessed [Month Year]).

Helmuth, L., 2009, The ten most spectacular geologic sites: Smithsonian Magazine: <https://www.smithsonianmag.com/science-nature/the-ten-most-spectacular-geologic-sites-38476122/> (May 2024).

Witscher, E., 2024, Land movement hazards in a changing climate: Speaking of Geoscience: <https://speakingofgeoscience.org/2024/01/31/land-movement-hazards-in-a-changing-climate/> (accessed May 2024).

*[Websites should only appear in References Cited section when referring to published entities offered on a website, including articles, books, blogs, etc. When citing an entire website or referring to general content on the site, mention the title of the site in the main text of the paper with the web address appearing in parentheses beside the title. It will not need to appear in the References Cited section.]*

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