



Big Ideas

Resources

Books

- Donovan, S., & J. Bransford, 2005, *How Students Learn: Science in the Classroom*, National Academies Press, Washington, DC, http://books.nap.edu/catalog.php?record_id=10126.
- Wiggins, G. P., & J. McTighe, 2005, *Understanding by Design, 2nd edition*, Association for Supervision and Curriculum Development, Alexandria, VA, 382 pp.
- Wiske, M. S., ed., 1998, *Teaching for Understanding: Linking Research with Practice*, Jossey-Bass, San Francisco, CA, 379 pp.

Websites

- Exploring Geoscience Methods with Secondary Education Students*, by J. Ebert, S. Linneman, & J. Thomas,
http://serc.carleton.edu/integrate/teaching_materials/geosci_methods/index.html.



Resources

Resources

General Books on Geologic History

- Bjornerud, M., 2005, *Reading the Rocks: The Autobiography of the Earth*, Westview Press, Cambridge, MA, 237 pp.
- Fortey, R. A., 2004, *The Earth, An Intimate History*, HarperCollins, London, 509 pp.
- Hazen, R. M., 2012, *The Story of Earth: The First 4.5 Billion Years, from Stardust to Living Planet*, Viking, New York, 306 pp.
- Kious, J., & R. I. Tilling, 1996, *The Dynamic Earth: The Story of Plate Tectonics*, US Geological Survey, Washington, DC, <http://pubs.usgs.gov/gip/dynamic/dynamic.html>.
- Maddougall, J. D., 1996, *A Short History of Planet Earth: Mountains, Mammals, Fire, and Ice*, Wiley, New York, 266 pp.
- Morton, J. L., 2004, *Strata: The Remarkable Life Story of William Smith, the Father of English Geology, new edition*, Brocken Spectre, Horsham, UK, 171 pp.
- Powell, J., 2001, *Mysteries of Terra Firma: The Age and Evolution of the Earth*, Free Press, New York, 256 pp.
- Winchester, S., & S. Vannithone, 2001, *The Map That Changed the World: William Smith and the Birth of Modern Geology*, HarperCollins, New York, 329 pp.

General Websites on Geologic History

- Color-coded Continents!*, US Geological Survey. [Reconstructions of color-coded continental motions from 620 million years ago through the present; maps from C. Scotese.] <http://geomaps.wr.usgs.gov/parks/pltec/scplseqai.html>.
- Earth Viewer*, by BioInteractive at Howard Hughes Medical Institute. [Free iPad app; an interactive paleogeographic atlas of the world; state and country overlays allows tracking the development of the Western States.] <http://www.hhmi.org/biointeractive/earthviewer>.
- Geologic Maps of the 50 United States*, by Andrew Alden, <http://geology.about.com/od/maps/iq/stategeomaps/>.
- North America During the Last 150,000 Years*, compiled by J. Adams, <http://www.esd.ornl.gov/projects/gen/mercNORTHAMERICA.html>.
- The Paleomap Project*, C. R. Scotese, <http://www.scotese.com>.
- Paleogeography*, R. Blakey. [The older, but free, version of the site.] <https://www2.nau.edu/rcb7/RCB.html>.
- Reconstructing the Ancient Earth*, Colorado Plateau Geosystems. [R. Blakey, updated site.] <http://cpgeosystems.com/index.html>.
- Tour of Geologic Time*, University of California Museum of Paleontology. [Online interactive geologic calendar exhibit.] <http://www.ucmp.berkeley.edu/help/timeform.php>.

Books and Articles on Geologic History of the Southwest

- Baldrige, W. S., 2004, *Geology of the American Southwest: A Journey through Two Billion Years of Plate-Tectonic History*, Cambridge University Press, 314 pp.
- Peal, R. H., 1978, *Colorado Stratigraphic Correlation Chart*, Colorado Geological Survey, <http://store.coloradogeologicalsurvey.org/product/colorado-stratigraphic-correlation-chart/>.
- Rasmussen, J. C., 2012, Geologic History of Arizona, *Rocks & Minerals*, 87(1): 56–63, http://www.janrasmussen.com/pdfs/geol_hist_az_Rasmussen_2012%20preprint.pdf.
- Timmons, M. J., & C. A. Manduca, eds., 2012, Grand Canyon geology: Two billion years of Earth's history, *Geological Society of America Special Paper* 489, 156 pp.

For more resources on geologic history, see the section "General geology resources by state" at the end of this volume.



Geologic History

Resources

Websites on Geologic History of the Southwest

- The Great Unconformity of the Grand Canyon and the Late Proterozoic-Cambrian Time Interval: Part I - Defining It*, by J. Share, 2012, <http://written-in-stone-seen-through-my-lens.blogspot.com/2012/01/great-unconformity-of-grand-canyon-part.html>.
- The Great Unconformity and the Late Proterozoic-Cambrian Time Interval: Part II - The Rifting of Rodinia and the "Snowball Earth" Glaciations That Followed*, by J. Share, 2012, http://written-in-stone-seen-through-my-lens.blogspot.com/2012_02_01_archive.html.
- The Great Unconformity at Baker's Bridge: Part III - Regional Geological and Global Bio-Evolutionary Significance*, by J. Share, 2014, <http://written-in-stone-seen-through-my-lens.blogspot.com/2014/01/the-great-unconformity-at-bakers-bridge.html>.
- Sedimentary Rock Formations of the Grand Canyon, In the Playground of Giants*, by Ken Bevis (Department of Geology, Hanover College), <http://intheplaygroundofgiants.com/geology-of-the-grand-canyon-region/sedimentary-rock-formations-of-the-grand-canyon-region/>.

Activities

- Okland, L., 1991, Paleogeographic mapping, in: R. H. Macdonald, & S. G. Stover, eds., *Hands-on Geology: K-12 Activities and Resources*, Society for Sedimentary Geology (SEPM), Tulsa, OK. [Constructing paleogeographic maps for elementary and middle school students.] https://www.beloit.edu/sepm/Fossil_Explorations/Paleogeographic_Mapping.html.
- Toilet Paper Analogy for Geologic Time*, by J. Wenner, in: Teaching Quantitative Skills in the Geosciences, at Resources for Undergraduate Students and Faculty, SERC. [Demonstration of geological time using a 1000 sheet roll of toilet paper.] <http://serc.carleton.edu/quantskills/activities/TPGeoTime.html>.
- Understanding Geologic Time*, Texas Memorial Museum at the University of Texas at Austin. [Timeline activity for middle school students.] <http://www.jsq.utexas.edu/glow/files/Understanding-Geologic-Time-6-8.pdf>.



Resources

Resources

Rock and Mineral Field Guides

- Bonewitz, R. L., 2008, *Rock and Gem*, Dorling Kindersley, NY, 360 pp.
- Chesterman, C. W., 1979, *National Audubon Society Field Guide to North American Rocks and Minerals*, Knopf, New York, 850 pp.
- Dixon, D., & R. L. Bernor, 1992, *The Practical Geologist: The Introductory Guide to the Basics of Geology and to Collecting and Identifying Rocks*, Simon and Schuster, New York, 160 pp.
- Hausel, W.D., 2014, *A Guide to Finding Gemstones, Gold, Minerals, and Rocks*, Gemhunter Publications: Gilbert, AZ, 370 pp.
- Mitchell, J., 2008, *The Rockhound's Handbook, revised edition*, Gem Guides Book Company, Baldwin Park, CA, 299 pp.
- Pellant, C., 2002, *Rocks & Minerals*, Dorling Kindersley (Smithsonian Handbooks), New York, 256 pp.
- Prinz, M., G. Harlow, & J. Peters, eds., 1978, *Simon & Schuster's Guide to Rocks & Minerals*, Simon and Schuster, New York, 607 pp.

For additional resources on minerals, see the resources section in Chapter 5: Mineral Resources.

General Books and Websites on Rocks

- Atlas of Igneous and Metamorphic Rocks, Minerals and Textures*, University of North Carolina Geology Department, <http://leggeo.unc.edu/Petunia/IgMetAtlas/mainmenu.html>.
- Raymond, L., 2007, *Petrology: The Study of Igneous, Sedimentary and Metamorphic Rocks*, Waveland Press, Long Grove, IL, 768 pp. [College textbook.]
- Rocks*, Kentucky Geological Survey and University of Kentucky, <https://www.uky.edu/KGS/rocksmn/rocks.htm>.
- Rock Types*, by S. Sepp, Sandatlas, <http://www.sandatlas.org/rock-types>.
- Vernon, R. H., 2000, *Beneath Our Feet: The Rocks of Planet Earth*, Cambridge University Press, Cambridge, UK, 216 pp.

Books, Articles, and Websites on Rocks of Specific Areas of the Southwest

Multistate areas

- Romaine, G., 2014, *Rocks, Gems, and Minerals of the Southwest*, FalconGuides, an imprint of Globe Pequot Press: Guilford, CT, 160 pp.
- Rygle, K. & S. Pedersen, 2016, *Southwest Treasure Hunter's Gem and Mineral Guide: Where and How to Dig, Pan and Mine Your Own Gems and Minerals, 6th edition*, GemStone Press: Woodstock, VT, 224 pp.

Arizona

- Anthony, J., 1995, *Mineralogy of Arizona, 3rd edition*, University of Arizona Press, Tucson, AZ, 508 pp.
- Bearce, N., 2006, *Minerals, Fossils, and Fluorescents of Arizona: a Field Guide for Collectors*, Arizona Desert Ice Press, Tempe, AZ, 401 pp.
- Blair, G., 2008, *Rockhounding Arizona: a Guide to 75 of the State's Best Rockhounding Sites*, Falcon Guides, Guilford, CT, 232 pp.
- Kappele, W. & G. Warren, 2014, *Rockhounding Utah: a guide to the State's Best Rockhounding Sites*, FalconGuides, Guilford, CT, 208 pp.
- Lynch, B. & D. Lynch, 2010, *Arizona Rocks & Minerals: a Field Guide to the Grand Canyon State*, Adventure Publications, Cambridge, MN, 252 pp.



Resources

Colorado

- Eckel, E., R., Cobban, & S. Mosburg, S., 1997, *Minerals of Colorado*, Fulcrum Publishers, Golden, CO, 676 pp.
- Eckel, E.B., & Mendenhall, C., 2015, *Minerals of Colorado: A 100-Year Record*, CreateSpace Independent Publishing Platform, North Charleston, SC, 484 pp.
- Kappele, W. & C. Kappele, 2004, *Rockhounding Colorado*, Falcon Press, Helena, MT, 256 pp.
- Mitchell, J., 2007, *Gem Trails of Colorado*, Gem Guides Book Company, Baldwin Park, CA, 224 pp.
- Romaine, G., 2014, *Rocks, Gems, and Minerals of the Rocky Mountains*, FalconGuides, an imprint of Globe Pequot Press, Guilford, CT, 176 pp.

New Mexico

- Lynch, D. & Lynch, B., 2014, *New Mexico Rocks & Minerals: a Field Guide to the Land of Enchantment*, Adventure Publications, Cambridge, MN, 320 pp.
- Mitchell, J., 2010, *Gem Trails of New Mexico*, Gem Guides Book Company, Baldwin Park, CA, 280 pp.
- Rockhounding Guide to New Mexico*, New Mexico Bureau of Geology and Mineral Resources, 111 pp., <http://geoinfo.nmt.edu/publications/guides/rockhound/RockhoundGuide.pdf>.
- Vaskys, R. & M. Freed, 2008, *Rockhounding New Mexico: a Guide to 140 of the State's Best Rockhounding Sites*, Globe Pequot Press, Guilford, CT, 272 pp.
- Voynick, S., 1997, *New Mexico Rockhounding: a Guide to Minerals, Gemstones, and Fossils*, Mountain Press Publishing Company, Missoula, MT, 309 pp.

Utah

- Kappele, W. & G. Warren, 2014, *Rockhounding Utah: a Guide to the State's Best Rockhounding Sites*, FalconGuides., Guilford, CT, 208 pp.
- Mitchell, J., 2006, *Gem Trails of Utah*, Gem Guides Book, Baldwin Park, CA, 232 pp.
- Wilson, J. R., 1995, *A Collector's Guide to Rock, Mineral, & Fossil Localities of Utah*, Utah Geological Survey Miscellaneous Publication, 148 pp.



Resources

Resources

General Books on the Fossil Record and Evolution

- Allmon, W. D., 2009, *Evolution & Creationism: a Very Short Guide, 2nd edition*, Paleontological Research Institution, Ithaca, NY, 128 pp.
- Benton, M. J., 2008, *The History of Life: a Very Short Introduction*, Oxford University Press, Oxford, UK, 170 pp.
- Fenton, C. L., & M. A. Fenton, 1958, *The Fossil Book: A Record of Prehistoric Life*, Doubleday, Garden City, NY, 482 pp. (A well-illustrated classic.)
- Fortey, R. A., 1998, *Life: A Natural History of the First Four Billion Years of Life on Earth*, Alfred A. Knopf, New York, 346 pp.
- Knoll, A. H., 2003, *Life On a Young Planet: The First Three Billion Years of Evolution on Earth*, Princeton University Press, Princeton, NJ, 277 pp.
- Lockley, M.G., 1991, *Tracking Dinosaurs: a New Look at an Ancient World*, Cambridge University Press, Cambridge, 238 pp.
- Nudds, J.R., & P.A. Selden, 2008, *Fossil Ecosystems of North America: a Guide to the Sites and their Extraordinary Biotas*, University of Chicago Press, Chicago, 288 pp.
- Prothero, D.R., 2006, *After the Dinosaurs: the Age of Mammals*, Indiana University Press, Bloomington, 362 pp.
- Sampson, S. D., 2011, *Dinosaur Odyssey: Fossil Threads in the Web of Life*, University of California Press, Berkeley, CA, 352 pp.
- Shubin, N., 2009, *Your Inner Fish: a Journey into the 3.5-Billion-Year History of the Human Body*, Vintage Books, NY, 256 pp.
- Switek, B., 2010, *Written In Stone: Evolution, the Fossil Record, and Our Place In Nature*, Bellevue Literary Press, New York, 320 pp.
- Thomson, K. S., 2005, *Fossils: a Very Short Introduction*, Oxford University Press, Oxford, UK, 147 pp.

Guides to Collecting and Identifying Fossils

- Arduini, P., G. Teruzzi, & S. S. Horenstein, 1986, *Simon & Schuster's Guide to Fossils*, Simon and Schuster, New York, 317 pp.
- Garcia, F. A., & D. S. Miller, 1998, *Discovering Fossils: How To Find and Identify Remains of the Prehistoric Past*, Stackpole Books, Mechanicsburg, PA, 212 pp.
- Lichter, G., 1993, *Fossil Collector's Handbook: Finding, Identifying, Preparing, Displaying*, Sterling Publishing Company, New York, 160 pp.
- Macdonald, J. R., 1983, *The Fossil Collector's Handbook: a Paleontology Field Guide*, Prentice-Hall, Englewood Cliffs, NJ, 193 pp.
- Murray, M., 1967, *Hunting for Fossils: a Guide to Finding and Collecting Fossils in All Fifty States*, Macmillan Company, Toronto, Canada, 348 pp.
- Nudds, J. R., & P. A. Selden, 2008, *Fossil Ecosystems of North America: a Guide to the Sites and their Extraordinary Biotas*, University of Chicago Press, Chicago, 288 pp.
- Parker, S., 1990, *The Practical Paleontologist: a Step-By-Step Guide To Finding, Studying, and Interpreting Fossils*, Simon and Schuster, New York, 159 pp.
- Parker, S., 2007, *Fossil Hunting: an Expert Guide to Finding and Identifying Fossils and Creating a Collection*, Southwater, London, 96 pp.
- Ransom, J. E., 1964, *Fossils In America: their Nature, Origin, Identification and Classification and a Range Guide To Collecting Sites*, Harper and Row, New York, 402 pp.
- Thompson, I., 1982, *The Audubon Society Field Guide To North American Fossils*, Knopf, New York, 846 pp.
- Walker, C., D. Ward, & C. Keates, 2009, *Fossils*, Dorling Kindersley (Smithsonian Handbooks), New York, 320 pp.



Resources

Books, Articles, and Websites on Fossils of Specific Areas of the Southwest

Multistate areas

- Foster, J., 2007, *Jurassic West: The Dinosaurs of the Morrison Formation and Their World*, Indiana University Press, Bloomington, 416 pp.
- Lockley, M. G., & A. P. Hunt, 1995, *Dinosaur Tracks and Other Fossil Footprints of the Western United States*, Columbia University Press, New York, 338 pp.
- Ratkevich, R. P., 1976, *Dinosaurs of the Southwest*, University of New Mexico Press, Albuquerque, 115 pp.
- Sadler, C., 2007, *Life in Stone: Fossils of the Colorado Plateau*, Grand Canyon Association, Grand Canyon, AZ, 72 pp.
- Tidwell, W. D. 1998, *Common Fossil Plants of Western North America*, Smithsonian Institution Press, Washington, DC, 299 pp.

Arizona

- Fossils*, Grand Canyon National Park, National Park Service, <http://www.nps.gov/grca/learn/nature/fossils.htm>.
- Fossils*, Petrified Forest National Park, National Park Service, <http://www.nps.gov/pefo/naturescience/fossils.htm>.
- Heckert, A. B. & S. G. Lucas, eds., 2005, Vertebrate paleontology in Arizona, *New Mexico Museum of Natural History and Science Bulletin*, 29: 210 pp. [Technical]
- Ratkevich, R. P., 1979, *Field Guide to Arizona Fossils*, Dinograph Southwest, Alamogordo, NM, 114 pp.
- Sedimentary Rock Formations of the Grand Canyon, In the Playground of Giants*, by Ken Bevis (Department of Geology, Hanover College), <http://intheplaygroundofgiants.com/geology-of-the-grand-canyon-region/sedimentary-rock-formations-of-the-grand-canyon-region/>.
- Thayer, D., 2009, *An Introduction to Grand Canyon Fossils*, Grand Canyon Association, Grand Canyon, AZ, 64 pl.
- Timmons, M. J., & C. A. Manduca, eds., 2012, Grand Canyon geology: Two billion years of Earth's history, *Geological Society of America Special Paper* 489, 156 pp. [Technical]

Colorado

- Ancient Denvers*, Denver Museum of Nature and Science, 2002, <http://www.dmns.org/main/minisites/ancientDenvers/landscapes.html>.
- Dinosaur National Monument*, National Park Service, <http://www.nps.gov/dino/index.htm>.
- Grande, L., 2013, *The Lost World of Fossil Lake: Snapshots from Deep Time*, University of Chicago Press, Chicago, 432 pp.
- Jenkins, J. T., & J. L. Jenkins, 1993, Colorado's dinosaurs, *Colorado Geological Survey Special Publication* 35, 74 pp.
- Johnson, K. R., & R. G. Reynolds, 2006, *Ancient Denvers: Scenes from the Past 300 Million Years of the Colorado Front Range*, Denver Museum of Science and Nature, Denver, CO, 32 pp.
- Leopold, E. B., & H. W. Meyer, 2012, *Saved in Time: the Fight to Establish Florissant Fossil Beds National Monument, Colorado*, University of New Mexico Press, Albuquerque, 139 pp.
- Lockley, M. G., 2001, *A Field Guide to Dinosaur Ridge, 3rd edition*, Friends of Dinosaur Ridge/University of Colorado at Denver Dinosaur Tracker Research Group, Denver, CO, 32 pp.
- Lockley, M., 2003, *Fossil Footprints of the Dinosaur Ridge and Fossil Trace Areas, 2nd edition*, Friends of Dinosaur Ridge/University of Colorado at Denver Dinosaur Tracker Research Group, Denver, CO, 66 pp.
- Meyer, H. W., 2003, *Fossils of Florissant*, Smithsonian Institution Press, Washington, DC, 272 pp.
- Milito, S., 2010, A survey of fossils and geology of Red Rock Canyon Open Space, Colorado Springs, Colorado, *The Mountain Geologist*, 47(1): 1–14.
- Wright, J. L., 2004, Walking with dinosaurs (and other extinct animals) along Colorado's Front Range: a field trip to Paleozoic and Mesozoic terrestrial localities, *GSA Field Guides*, 5: 219–234. [Technical]



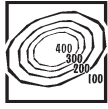
Resources

New Mexico

- Colbert, E. H., 1995, *The Little Dinosaurs of Ghost Ranch*, Columbia University Press, New York, 250 pp.
- Ghost Ranch Geologic Tour*, New Mexico Bureau of Geology and Mineral Resources, https://geoinfo.nmt.edu/tour/landmarks/ghost_ranch/home.html.
- Kues, B., 2008, *The Paleontology of New Mexico*, University of New Mexico Press, Albuquerque, 446 pp.
- Lucas, S. G., & A. B. Heckert, eds., 2000, Dinosaurs of New Mexico, *New Mexico Museum of Natural History and Science Bulletin* 17, 230 pp. [technical]
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Utah

- Barnes, F. A. 1997, *Canyon Country Dinosaur Tracks and Trackers*, Canyon Country Publications, Moab, UT, 176 pp.
- Cleveland-Lloyd Dinosaur Quarry*, Utah, Geologic Site Seeing, Bureau of Land Management, http://www.blm.gov/wo/st/en/res/Education_in_BLM/Learning_Landscapes/For_Travelers/go/geology/cleveland-lloyd.print.html.
- DeCourten, F., 2014, *Dinosaurs of Utah, 2nd edition*, University of Utah Press, Salt Lake City, 336 pp.
- Dinosaurs and Fossils*, Utah Geological Survey, <http://geology.utah.gov/popular/general-geology/dinosaurs-fossils/>.
- Gillette, D. D., ed., 1999, Vertebrate paleontology in Utah, *Utah Geological Survey Miscellaneous Publication* 99-1, 554 pp. [Technical]
- Harris, J. D., & A. R. C. Milner, 2015, *Tracks in Deep Time: the St. George Dinosaur Discovery Site at Johnson Farm*, University of Utah Press, Salt Lake City, 99 pp.
- Mesozoic Fossils*, Glen Canyon National Recreation Area, National Park Service, <https://www.nps.gov/glca/learn/nature/copy-of-mesozoicfossils.htm>.
- Robison, R. A., L. E. Babcock, & V. G. Gunther, 2015, Exceptional Cambrian fossils from Utah: a window into the age of trilobites, *Utah Geological Survey Miscellaneous Publication* 15-1, 97 pp.
- Squatting Dinosaur Tracks at Johnson's Farm in St. George (Basal Jurassic Dinosaur Footprints, Fishes, and Plants, Whitmore Point Member of the Moenave Formation)*, by Nancy Carruthers, Utah Geological Survey, <http://www.sunstar-solutions.com/AOP/fieldtrips/Juratracks/BasalJurassic.htm>.
- Titus, A. L., & M. A. Loewen, 2013, *At the Top of the Grand Staircase: the Late Cretaceous of Southern Utah*, Indiana University Press, Bloomington, 634 pp. [technical]
- Wilson, J. R., 1995, A collector's guide to rock, mineral and fossil localities in Utah, *Utah Geological Survey Miscellaneous Publication* 95-4, 148 pp.



Topography

Resources

Resources

Books on Topography

- de Blij, H. J., P. O. Muller, J. E. Burt, & J. A. Mason, 2013, *Physical Geography of the Global Environment*, Oxford University Press, New York, 626 pp.
- Trimble, D.E., 1980, *The Geologic Story of the Great Plains*, Geological Survey Bulletin 1493, US Government Printing Office, Washington, D.C., <http://library.ndsu.edu/exhibits/text/greatplains/text.html>.
- Wyckoff, J., 1999, *Reading the Earth: Landforms in the Making*, Adastral West, Mahwah, NJ, 352 pp.

Topographic Maps

- Color Landform Atlas of the US*, <http://fermi.jhuapl.edu/states/states.html>. (Low resolution shaded relief maps of each state.)
- Topoquest*, <https://www.topoquest.com/>.

Websites on Topography

- OpenLandform Catalog*, Education Resources, OpenTopography. [High resolution topographic images that may be useful in teaching.] <http://www.opentopography.org/index.php/resources/lidarlandforms>.
- Physiographic Provinces*, in: Earth Science Concepts: Geology by Region, National Park Service, http://www.nature.nps.gov/geology/education/concepts/concepts_regional_geology.cfm.
- Teaching Geomorphology in the 21st Century*, On the Cutting Edge, Strong Undergraduate Geoscience Teaching, SERC. [A set of resources for college level, some of which may be adaptable to secondary education.] <http://serc.carleton.edu/NAGTWorkshops/geomorph/index.html>.
- Teaching with Google Earth*, On the Cutting Edge, Starting Point: Teaching Entry Level Geoscience, SERC, http://serc.carleton.edu/introgeo/google_earth/index.html.
- United States Geography*, by S.S. Birdsall & J. Florin, <http://countrystudies.us/united-states/geography.htm>.
- US Geography: The Land Geography, Landscape, and Landforms of the US, 50 State Guide*, eReference Desk. [Includes state-by-state information on geography.] <http://www.ereferencedesk.com/resources/state-geography/>.

Topography Resources for the Southwest

- Davis, W., 2013, *River Notes: a Natural and Human History of the Colorado*, Island Press, Washington, D.C., 176 pp.
- Owen, D., 2015, Where the river runs dry: the Colorado and America's water crisis, *The New Yorker* (May 25, 2015), <http://www.newyorker.com/magazine/2015/05/25/the-disappearing-river>.
- Physiographic Provinces*, Virtual Geologic Tour of New Mexico, New Mexico Bureau of Geology and Mineralogical Resources, <http://geoinfo.nmt.edu/tour/provinces/home.html>.
- Sand Dunes of the Southwest*, by Peter Olsen, <http://sand.xboltz.net/>.

For additional resources relevant to topography, see the section "General Geology Resources by State" at the end of this volume.



Resources

Resources

Books and Articles on Mineral Resources

- Frank D., J. Galloway, & K. Assmus, 2005, The life cycle of a mineral deposit – a teacher's guide for hands-on mineral education activities, *US Geological Survey General Information Product 17*, 40 pp.
- Johnsen, O., 2002, *Minerals of the World*, Princeton University Press, Princeton, NJ, 439 pp.
- Long, K.R., B.S. Van Gosen, N.K. Foley, & D. Cordier, 2010, The principal rare earth elements deposits of the United States: a summary of domestic deposits and a global perspective, *US Geological Survey Scientific Investigations Report 2010–5220*, 96 pp., <http://pubs.usgs.gov/sir/2010/5220/pdf/SIR2010-5220.pdf>.
- Skinner, B. J., 1989, Mineral resources of North America, in A.W. Bally & A.R. Palmer, eds., *The Geology of North America: An Overview, vol. A*, The Geological Society of America: Boulder, CO, pp. 575-584.
- Stevens, R., 2010, *Mineral Exploration and Mining Essentials*, Pakawau GeoManagement, Port Coquitlam, BC, 322 pp.
- Wark, J., 2012, *The World of Mining*, CRC Press/Balkema, Boca Raton, FL, 250 pp. [Coffee-table book]

For mineral field guides, see the Resources section in Chapter 2: Rocks.

Websites on Mineral Resources

- [Copper] Education, Copper Development Association, <https://www.copper.org/education/>.
- Handbook of Mineralogy*. [Technical information on 420 minerals available as free individual pdfs.] <http://www.handbookofmineralogy.org>.
- Mineral Data*, Hudson Institute of Mineralogy. [Claims to be the world's largest public database of mineral information.] <http://www.mindat.org>.
- Mineral Gallery*, Amethyst Galleries, <http://www.galleries.com/>.
- Mineralogy Database*, <http://webmineral.com>.
- Mineralpedia—A Mineral Photo Database and Identification Guide*, by T. Loomis & V. Loomis, Dakota Matrix Minerals, <http://www.dakotamatrix.com>.
- Mining History Association, <http://www.mininghistoryassociation.org/links.htm#museums>.
- Mining Museums and Tours*, National Mining Association, <http://www.nma.org/index.php/mining-resources/mining-museums-and-tours>.
- The New International Mineralogical Association List of Minerals—A Work in Progress*, updated July 2016, http://nrmima.nrm.se/IMA_Master_List_%282016-07%29.pdf.
- Some Definitions of Common Terms Used in Describing Mineral Deposits*, Earth Science Australia, http://earthsci.org/mineral/mindep/depfile/ore_def.htm.
- The Gem Hunter*, W.D. Hausel, <http://gemhunter.webs.com>.
- US Geological Survey. [A wide range of data on mineral distribution and mining.] <http://minerals.usgs.gov/>.

Books and Articles on Mineral Resources of Specific Areas of the Southwest

Books and Articles

- Anthony, J., 1995, *Mineralogy of Arizona, 3rd edition*, University of Arizona Press, Tucson, AZ, 508 pp.
- Arizona Bureau of Mines, 2016, *The Mineral Industries of Arizona: a Brief History of the Development of Arizona's Mineral Resources*, CreateSpace Independent Publishing Platform, North Charleston, SC, 48 pp.



Resources

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- Lundwall, H. & T. Humble, 2012, *Copper Mining in Santa Rita, New Mexico, 1801–1838*, Sunstone Press, Santa Fe, NM, 160 pp.
- Northrop, S. & F. LaBruzza, 1996, *Minerals of New Mexico, 3rd edition*, University of New Mexico Press, Albuquerque, 346 pp.
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- Highland, L., Landslide types and processes, 2004, *US Geological Survey Fact Sheet 2004-3072*, 4 pp., <http://pubs.usgs.gov/fs/2004/3072/pdf/fs2004-3072.pdf>.
- Highland, L. M., & Bobrowsky, P., 2008, The landslide handbook—A guide to understanding landslides, *US Geological Survey Circular 1325*, 129 pp.



Resources

Landslide Hazards Program, US Geological Survey, <http://landslides.usgs.gov/>.
Landslides in the United States Since 2007 (map), National Geographic, <http://news.nationalgeographic.com/news/2014/04/140422-surveying-american-landslides-interactive/>.
 Wald, L., *Reconstruction of an Avalanche: The West Salt Creek Rock Avalanche, Colorado, May 25, 2014*, Landslide Hazards Program, USGS, <http://landslides.usgs.gov/research/featured/2015-westsaltcreek/>.

Karst, Sinkholes, and Fissures

Arizona's Earth Fissure Center, The Arizona Geological Survey, <http://www.azgs.az.gov/EFC.shtml>.
 Hill, C. A., 2003, Caves and karst in New Mexico, New Mexico Bureau of Geology and Mineral Resources, *New Mexico Earth Matters*, 3(1): 1–4, https://geoinfo.nmt.edu/publications/periodicals/earthmatters/3/n1/em_v3_n1.pdf.
 Lindberg, P. A., 2009, *Devil's Kitchen Sinkhole—Sedona, AZ: a Potential Geohazard*, The Arizona Geological Survey, http://www.azgs.az.gov/arizona_geology/winter09/article_devilskitchen.html.

Resources on Tectonics-related Earth Hazards

Earthquakes

A Brief History of Earthquake Activity in Arizona, AZ Central, <http://www.azcentral.com/story/news/arizona/2014/06/30/arizona-earthquake-timeline/11787839/>.
Earthquakes [in Colorado], Colorado Geological Survey, <http://coloradogeologicalsurvey.org/geologic-hazards/earthquakes/>.
 Fellows, L. D., 2000, Earthquake hazard in Arizona, Arizona Geological Survey, *Arizona Geology*, 30(1): 1–4, http://www.azgs.az.gov/Hazards_ocr/earthquakes/Earthquake%20Hazard%20in%20AZ-2000.pdf.
 Haneberg, B., 2016, *Do We Have Earthquakes in New Mexico?*, New Mexico Bureau of Geology and Mineral Resources, <http://tremor.nmt.edu/faq/here.html>.
 Incorporated Research Institutions for Seismology (IRIS) Education and Public Outreach, <http://www.iris.edu/hq/programs.epo>.
Induced Earthquakes, Earthquake Hazards Program, US Geological Survey, <http://earthquake.usgs.gov/research/induced/>.
IRIS Seismic Monitor, Incorporated Research Institutions for Seismology (IRIS), <http://www.iris.edu/seismon/>.
Putting Down Roots in Earthquake Country: Your Handbook for Earthquakes in Utah, 2008, Utah Seismic Safety Commission, 33 pp., http://www.utah.gov/beready/documents/roots_earthquake_low.pdf.
 Stover, C. W., and J. L. Coffman, 1993, Seismicity of the United States, 1568–1989 (revised), *US Geological Survey Professional Paper 1527*, 418 pp., <http://pubs.usgs.gov/pp/1527/report.pdf>.
 Eldredge, S. N., 1996, The Wasatch Fault, *Utah Geological Survey Public Information Series 40*, 17 pp., <http://files.geology.utah.gov/online/pdf/pi-40.pdf>.
Today in Earthquake History, Earthquake Hazards Program, US Geological Survey. [Content abridged from Stover & Coffman, 1993.] <http://earthquake.usgs.gov/learn/today>.
U of U Seismic Stations, Earthquake Center, University of Utah, <http://quake.utah.edu/earthquake-center/quake-map>.
US Earthquake Information by State/Territory, USGS Earthquake Hazards Program, <http://earthquake.usgs.gov/earthquakes/states/>.
US Earthquake Monitor, US Geological Survey, <http://earthquake.usgs.gov/earthquakes/map/>.
Utah Faults, Utah Geological Survey, <http://geology.utah.gov/hazards/earthquakes-faults/utah-faults/>.

Volcanoes

Duffield, W., 1997, *Volcanoes of Northern Arizona: Sleeping Giants of the Grand Canyon Region*, Grand Canyon Association, Grand Canyon, AZ, 68 pp.
Frequently Asked Questions about New Mexico Volcanoes, New Mexico Bureau of Geology and Mineral Resources, <https://geoinfo.nmt.edu/faq/volcanoes/>.
 Hagadorn, J., 2015, *Colorado's Volcanoes, Just the Facts*, Front Porch Stapleton [News], <https://frontporchstapleton.com/article/colorados-volcanoes/>.
 Pfeiffer, T., *Volcanoes of Canada and USA (Mainland)*, Volcano Discovery. [Volcanos active within the past 10,000 years.] <https://www.volcanodiscovery.com/north-america.html>.



The Volcanoes of New Mexico, Online Exhibits, New Mexico Museum of Natural History and Science,

<http://www.nmnaturalhistory.org/online-exhibits-geoscience/volcanoes-new-mexico>.

U.S. Volcanoes and Current Activity Alerts, Volcano Hazards Program, US Geological Survey,

<http://volcanoes.usgs.gov/index.html>.

Resources on Materials-related Earth Hazards

Radon

Radon, Colorado Department of Public Health and Environment, <https://www.colorado.gov/pacific/cdphe/categories/services-and-information/environment/radon>.

Radon Fact Sheet, Air Check Inc., 2009, http://www.radon.com/radon/radon_facts.html.

Radon: Health Risks, Environmental Protection Agency, 2013,

<http://www.epa.gov/radon/healthrisks.html>.

Radon Information, Environmental Protection Agency, <http://www.epa.gov/radon/index.html>.

Radon levels for [any US state], http://**-radon.info/ [in which ** = two-letter state code, such as AZ, CO, NM, or UT].

Radon (Rn), United States Environmental Protection Agency (EPA). [Includes state radon maps with county-level data.] <http://www.epa.gov/radon/whereyoulive.html>.

Asbestos

Harris, R. C., 2004, Asbestos in Arizona, Arizona Geological Survey, *Arizona Geology*, 34(1): 1–4, <http://www.azgs.gov/Mineral%20Scans/Asbestos%20in%20AZ%2004.pdf>.

Van Gosen, B. S., 2008, Reported historic asbestos mines, historic asbestos Prospects, and natural asbestos occurrences in the southwestern United States (Arizona, Nevada, and Utah), *US Geological Survey Open-File Report 2008-1095*, 1 plate, <http://pubs.usgs.gov/of/2008/1095>.

Earth Hazards Teaching Resources

Investigating Speed and Acceleration Using Tornado Tubes, Hamline University Graduate School of Education MnSTEP Teaching Activity Collection, <http://serc.carleton.edu/sp/mnstep/activities/27202.html>.

Karst Formation, City of Austin Youth Education resources, http://austintexas.gov/sites/default/files/files/Watershed/youth_education/karst_lesson_high_school.pdf.

Radke, J., *Impact of Natural Disasters on the Earth*, Hamline University Graduate School of Education MnSTEP Teaching Activity Collection, <http://serc.carleton.edu/sp/mnstep/activities/19789.html>.

Radon Activities from the Alabama Radon Program, Alabama and Auburn Universities Extension, <http://www.aces.edu/fcs/hndh/radon/alradon.php>.

Teaching Quantitative Concepts in Floods and Flooding, SERC Resources for Undergraduate Students and Faculty, <http://serc.carleton.edu/quantskills/methods/quantlit/floods.html>.



Resources

Resources

Field Geology Teaching Practices

- Greene, J. P., Kisida, B., & Bowen, D. H., 2014, The Educational Value of Field Trips, *Education Next*, 14(1), 78–86.
- Issigonis, M., 2006, Field trips as an aid to teaching Earth science courses, *The Earth Scientist*, 22(3): 14–16.
- Johnson, J.K., and Reynolds, S.J., 2005, Concept sketches—using student- and instructor-generated annotated sketches for learning, teaching, and assessment in geology courses. *Journal of Geoscience Education*, 53: 85–95.
- Orion, N., and Hofstein, A., 1994, Factors that influence learning during a scientific field trip in a natural environment, *Journal of Research in Science Teaching*, 31: 1097–1119.
- Russell, H.R., 1998, *Ten-Minute Field Trips*, 3rd edition, National Science Teachers Association: Alexandria, VA. [Focused on elementary and junior high; chapter on Earth science on pp. 113–137.]
- Shulman, L. S., 2005, Signature pedagogies in the professions, *Daedalus*, 134(3): 52–59.
- Whitmeyer, S.J., Pyle, E.J., Mogk, D.W. (eds.), 2009, *Field Geology Education: Historical Perspectives and Modern Approaches*, GSA Special Papers 461. [29 articles, focused on undergraduate education.] <http://specialpapers.gsapubs.org/content/461.toc>.
- Extraordinary Science Field Trips, *NSTA Reports*, Summer 2013, 25(1): 1–2. <http://www.nsta.org/docs/NSTARReports201307.pdf>.
- My Geologic Address: Locating Oneself in Geologic Time and Process, by Ault, K., SERC InTeGrate workshop "Teaching the Methods of Geoscience" activities, <http://serc.carleton.edu/integrate/workshops/methods2012/activities/ault.html>.
- Teaching in the Field, National Association of Geoscience Teachers. [Set of resources for teaching field geology.] http://nagt.org/nagt/teaching_resources/field/index.html.

Guides to Fieldwork

(Mostly focused on post secondary education, but useful as references)

- Coe, A., T. Argles, D. Rothery, and R. Spicer, 2010, *Geological Field Techniques*, Wiley Blackwell, Chichester. [This is a current standard.]
- Compton, R. R., 1962, *Manual of Field Geology*, John Wiley & Sons, New York. [An old classic.]
- Compton, R., 1985, *Geology in the Field*, Wiley, New York. [An updated version.]
- Lambert, D., 2006, *The Field Guide to Geology*. The Diagram Group.
- Lisle, R., P. Brabham, and J. Barnes, 2011, *Basic Geological Mapping*, Wiley-Blackwell, Hoboken, NJ.
- Maley, T. S., 2005, *Field Geology Illustrated*, 2nd edition, Mineral Land Publications, Boise, ID.
- Mathur, S. M., 2004, *Guide to Field Geology*, Prentice Hall of India, New Delhi.
- Spencer, E., 2006, *Geologic Maps : a Practical Guide to the Preparation and Interpretation of Geologic Maps*, Waveland Press, Long Grove, IL.
- Walker, J. & H. Cohen, 2009, *The Geoscience Handbook: AGI Data Sheets*, American Geological Institute, Alexandria, VA.
- Walker, J. D., and H. A. Cohen, 2007, *The Geoscience Handbook: AGI Data Sheets*, 4th edition, American Geological Institute.
- How to Read a Geologic Map*, Wisconsin Geological and Natural History Survey, <http://wgnhs.uwex.edu/wisconsin-geology/bedrock-geology/read-geologic-map/>.

Appendix

Resources

Following are some of the most commonly used and cited publications on science education standards and benchmarks.

- AAAS, 1993, *Benchmarks for Science Literacy*, Oxford University Press. [AAAS is American Association for Advance of Science.]
<http://www/rpkect2-61.org/publications/bsl/online/index.php>.
- Bransford, J. D., Brown, A. L., and Cocking, R. R., eds., 2000, *How People Learn: Brain, Mind, Experience, and School, expanded edition*, National Academies Press, Washington, DC,
http://www.nap.edu/openbook.php?record_id=9853.
- Common Core State Standards Initiative. [While not focused on science education directly, standards on math and non-fiction reading impact are importantly related.]
<http://www.corestandards.org>.
- NCSE, 2013, *Evolution and Climate Change in the NGSS*, National Center for Science Education, <http://ncse.com/news/2013/04/evolution-climate-change-ngss-0014800>.
- NGSS@NSTA website, National Science Teacher Association, <http://ngss.nsta.org/>.
- NRC, 1996, *National Science Education Standards*, National Academies Press, Washington, DC. [NRC is National Research Council, and body of the National Academy of Sciences.]
http://www.nap.edu/openbook.php?record_id=4962.
- NRC, 2011, *Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics*, National Academies Press, Washington, DC.
http://www.nap.edu/openbook.php?record_id=13158.
- NRC, 2012, *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*, National Academies Press, Washington, DC.
http://www.nap.edu/openbook.php?record_id=13165.
- NRC, 2013, *Next Generation Science Standards: For States, By States*, National Academies Press, Washington, DC, <http://www.nextgenscience.org/>.
- Wyssession, M., 2013, The Next Generation Science Standards and the Earth and Space Sciences, *The Science Teacher*, April/May issue. [Duggan-Haas, author of this Appendix, worked with Wyssession on NRC's Conceptual Framework for New Science Education Standards.] http://nstahosted.org/pdfs/ngss/resources/201304_NGSS-Wyssession.pdf.

General Resources

On the Earth System Science of North America

Books and Websites

- Bally, A. W., and Palmer, A. R., eds., 1989, *The geology of North America—An Overview, vol. A of The Geology of North America*, Geological Society of America, Boulder, CO, 619 p.
- Birdsall, S. S. & J. Florin, United States Geography, <http://countrystudies.us/united-states/geography.htm>.
- National Park Geologic Resources, <http://www.nature.nps.gov/geology/>.

Maps (printed)

- Thelin, G. P. and R. J. Pike, 1991, *Landforms of the Conterminous United States—A Digital Shaded-Relief Portrayal*, USGS Miscellaneous Investigations Series Map I-2206, <http://pubs.usgs.gov/imap/i2206/>.
- Muehlberger, W. R., compiler, 1992, *Tectonic Map of North America, Scale 1:5,000,000*, American Association of Petroleum Geologists, Tulsa, OK.
- Reed, J.C., and C.A. Bush, 2007, *Geology: the National Atlas of the United States 32" x 28"*, <http://pubs.usgs.gov/circ/1300/>.
- Reed, J.C., and C. A., Bush, 2007, About the geologic map in the National Atlas of the United States of America, *US Geological Survey Circular 1300*, 52 pp., http://pubs.usgs.gov/circ/1300/pdf/Cir1300_508.pdf.
- USGS, 2005, *Resources for the Geologic Map of North America*, <http://ngmdb.usgs.gov/gmna/>.
- Vigil, J.F., R. J. Pike, and D. G. Howell, 2000, *A Tapestry of Time and Terrain*, US Geological Survey Geologic Investigations Series 2720, 1 plate scale 1:2,500,000, 1 pamphlet, <http://pubs.usgs.gov/imap/i2720/>.

Maps (online)

- American Geological Institute's *Earth Comm 2nd edition*, Map Resources. [A compilation of online map resources.] <http://www.agiweb.org/education/earthcomm2/maps.html>.
- Geologic Maps of the 50 United States*, by A. Alden, About.com, <http://geology.about.com/od/maps/ig/stategeomaps/>.
- Geologic Provinces of the United States: Records of an Active Earth*, US Geological Survey, <http://geomaps.wr.usgs.gov/parks/province/>.
- Geology of the Conterminous United States*, <http://mrddata.usgs.gov/geology/us/>.
- Google Earth, <http://www.google.com/earth/>.
- The National Atlas of the United States*. [Custom-make maps.] <http://nationalatlas.gov/mapmaker>.
- The National Map*, <http://nationalmap.gov>.
- The National Map: Historical Topographic Map Collection*. [Online historic topographic maps.] <http://nationalmap.gov/historical/index.html>.
- OneGeology. [A collaboration among many national geological surveys to create a dynamic digital geological map data for the world.] <http://portal.onegeology.org/>.
- US Topo Quadrangles—Maps for America*. [Online topographic maps.] <http://nationalmap.gov/ustopo/index.html>.
- Vigil, J. F., R. J. Pike, & D. G. Howell, 2000, *A Tapestry of Time and Terrain*, US Geological Survey, Geologic Investigations Series 2720, <http://pubs.usgs.gov/imap/i2720/>.

Other General Resources on Earth System Science

Geologic Time Resources

- Gradstein, F. M., J. G. Ogg, M. D. Schmitz, & G. M. Ogg, *The Geologic Time Scale 2012*, 2 vols., Elsevier, New York, https://engineering.purdue.edu/Stratigraphy/charts/Stratigraphic_Chart_GTS2012.pdf.
- International Commission on Stratigraphy, <http://www.stratigraphy.org/>.
- Janke, P. R., 2013, *Correlated History of the Earth Chart (laminated)*, vol. 8, Pan Terra, Hill City, SD.

- The Paleontology Portal, <http://paleoportal.org>.
- Walker, J. D., J. W. Geissman, S. A. Bowring, & L. E. Babcock, compilers, 2012, *Geologic Time Scale Poster*, Geological Society of America, Boulder, CO.

• Dictionaries

- Allaby, M., 2013, *A Dictionary of Geology and Earth Sciences*, Oxford University Press, Oxford, UK.
- Bates, R. L., & J. A. Jackson, 1984, *Dictionary of Geological Terms, 3rd edition*, Anchor Press, Garden City, NY.
- McGraw-Hill Education, 2003, *McGraw-Hill Dictionary of Geology and Mineralogy*, McGraw-Hill, New York.
- Neuendorf, K. K. E., J. P. Mehl, Jr., & J. A. Jackson, 2011, *Glossary of Geology, 5th edition, revised*, American Geological Institute, Alexandria, VA, 800 pp.

• Earth System Science Organizations

- American Association of State Geologists, <http://www.stategeologists.org/>.
- American Geological Institute (AGI is an umbrella organization representing over 40 other geological organizations), <http://agiweb.org>.
- American Geophysical Union, <http://agu.org>.
- Association for Women Geoscientists, <http://awg.org>.
- Geological Society of America, <http://geosociety.org>.
- Natural Resources Conservation Service, <http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/> (NRCS helps US farmers, ranchers and forest landowners conserve soil, water, air and other natural resources).
- Paleontological Research Institution, <http://priweb.org> (publisher of this volume).
- Paleontological Society, <http://paleosoc.org>.
- US Geological Survey, <http://usgs.gov>.

• General Earth Science Education Resources

• Websites

- *Digital Library for Earth System Education (DLESE)*, <http://dlese.org>.
- *Earth Science World Image Bank*, American Geological Institute, <http://www.earthscienceworld.org/imagebank/>.
- *Resources for Earth Science and Geography Instruction*, by Mike Francek, Central Michigan University, <http://webs.cmich.edu/resqi/>.
- *Science in Your Backyard*, US Geological Survey. [State-by-state compilation of Earth science-related data, most of which will need to be adapted for education uses.] <http://www.usgs.gov/state/>.
- *SERC (The Science Education Resource Center) K-12 Resources*. [Hundreds of classroom activities organized by grade level and topic as well as guidance on effective teaching.] <http://serc.carleton.edu/k12/index.html>.
- *SERC Earth Exploration Toolbook*. [A collection of online Earth system science activities introducing scientific data sets and analysis tools.] <http://serc.carleton.edu/eet/index.html>.
- *Windows to the Universe*, from the National Earth Science Teachers Association, <http://www.windows2universe.org/>.

• Blogs

- AGU Blogosphere, American Geophysical Union. [A collection of over a dozen blogs by geoscientists on recent events and perspectives on the geosciences.] <http://blogs.agu.org/blogs/>.
- *The Best of Geology and Earth Science on the Web: the Latest from the Blogosphere*, <http://all-geo.org/>.
- *Geobulletin: News from the Geoblogosphere*, stratigraphy.net, <http://www.geobulletin.org/?action=news>.
- *Geotripper: News and Views from the Geologic Realm*, by Garry Hayes, Modesto Junior College. [Many, but not all, pertain to the western US.] <http://geotripper.blogspot.com/>.

• Science education organizations

- National Association of Geoscience Teachers. [Focused on undergraduate geoscience education, but includes active secondary school educators.] <http://nagt.org>.
- National Earth Science Teacher Association. [Focused on secondary school Earth science education.] <http://nestanet.org>.
- National Science Teacher Association, <http://nsta.org>.

General Resources by State

Geologic maps of individual US states. (Digital geologic maps of US states with consistent lithology, age, GIS database structure, and format.)
<http://mrddata.usgs.gov/geology/state>.

Multistate Areas of the Southwest

Books

- Abbott, L. & T. Cook, 2004, *Hiking the Grand Canyon's Geology*, The Mountaineers Books, Seattle, WA, 301 pp.
- Baars, D. L., 2000, *The Colorado Plateau: a Geologic History, revised edition*, University of New Mexico Press, Albuquerque, 268 pp.
- Baars, D. L., 2002, *A Traveler's Guide to the Geology of the Colorado Plateau*, The University of Utah Press, 294 pp.
- Baldrige, W., 2004, *Geology of the Southwest: a Journey Through Two Billion Years of Plate-Tectonic History*, Cambridge University Press, New York, 314 pp.
- Blakey, R. & W. Ranney, 2008, *Ancient Landscapes of the Colorado Plateau*, Grand Canyon Association, Grand Canyon, AZ, 156 pp.
- Chronic, H. & L. Chronic, 2004, *Pages of Stone: Geology of the Grand Canyon and Plateau Country National Parks and Monuments, 2nd edition*, The Mountaineers Books, Seattle, WA, 176 pp.
- Hopkins, R., 2002, *Hiking the Southwest's Geology: Four Corners Region*, The Mountaineers Books, Seattle, WA, 286 pp.
- McPhee, J., 1981, *Basin and Range*, Farrar, Straus, Giroux, NY, 240 pp.

Maps

Southern Rocky Mountain Region Geological Highway Map, revised edition, 1990, AAPG, Tulsa, OK. [Includes Arizona, Colorado, New Mexico, and Utah.]

Websites

- Encyclopedia of the Great Plains: Geology*, University of Nebraska, Lincoln,
<http://plainshumanities.unl.edu/encyclopedia/doc/egp.pe.028>.
- List of National Parks within the Colorado Plateau*, USGS Geology in the Parks,
<http://geomaps.wr.usgs.gov/parks/province/colo.html>.

Arizona

Books and Articles

- Abbott, L. & T. Cook, 2007, *Geology Underfoot in Northern Arizona*, Mountain Press Publishing Company, Missoula, MT, 330 pp.
- Beus, S.S., & M. Morales, eds., 1990, **Grand Canyon Geology**, Oxford University Press and Museum of Northern Arizona Press, 518 pp.
- Bezy, J. V., J. T. Gutmann, and G. B. Haxel, 2000, *A Guide to the Geology of Organ Pipe Cactus National Monument and the Pinacate Biosphere Reserve*, Arizona Geological Survey, 64 pp.
- Bryan, T., 2013, *Arizona Rocks! A Guide to Geologic Sites in the Grand Canyon State*, Mountain Press Publishing Company, Missoula, MT, 112 pp.
- Chronic, H., 1983, *Roadside Geology of Arizona*, Mountain Press Publishing Company, Missoula, MT, 322 pp.
- Hanson, S. L., 2003, *Roadside Geology: Wupatki Crater and Sunset Crater Volcano National Monuments*, Arizona Geological Survey, 32 pp.
- Lucchitta, I., 2001, *Hiking Arizona's Geology*, Mountaineers Books, Seattle, WA, 290 pp.
- Nations, D. and E. Stump, 1996, *Geology of Arizona, 2nd edition*, Kendall/Hunt Publishing Company, Dubuque, IA, 272 pp.
- Price, L., 1999, *An Introduction to Grand Canyon Geology*, Grand Canyon Association, Grand Canyon, AZ, 64 pp.
- Ranney, W., 2012, *Carving Grand Canyon: Evidence, Theories, and Mystery*, Grand Canyon Association, Grand Canyon, AZ, 200 pp.

Maps

Kamilli, R. and S. Richard, 1998, *Geologic Highway Map of Arizona*, Arizona Geological Society, Arizona Geological Survey, Tucson.

Websites

- Arizona Geological Society, <http://www.arizonageologicalsoc.org/>.
- Arizona Geological Survey, <http://www.azgs.az.gov/>.
- Arizona Geology, Blog of the State Geologist of Arizona, <http://arizonageology.blogspot.com/>.

The Geologic Origin of the Sonoran Desert, by R. Scarborough, Arizona-Sonora Desert Museum, Tucson, AZ, http://www.desertmuseum.org/books/nhsd_geologic_origin.php.
Grand Canyon Association, <https://www.grandcanyon.org/>.

Colorado

Books and Articles

- Abbott, L. and T. Cook, 2012, *Geology Underfoot Along Colorado's Front Range*, Mountain Press Publishing Company, Missoula, MT, 352 pp.
- Baars, D. L., 1992, *The American Alps: The San Juan Mountains of Southwest Colorado*, University of New Mexico Press, Albuquerque, 204 pp.,
- Blair, R., 1996, *The Western San Juan Mountains: Their Geology, Ecology, and Human History*, University of Colorado Press, Boulder, 406 pp.
- Chronic, H., 1984, *Time, Rocks, and the Rockies: a Geologic Guide to Rocks and Trails of Rocky Mountain National Park*, Mountain Publishing Company, Missoula, MT, 120 pp.
- Chronic, H. and F. Williams, 2002, *The Roadside Geology of Colorado*, Mountain Press Publishing Company, Missoula, MT, 398 pp.
- Fillmore, R., 2011, *Geological Evolution of the Colorado Plateau of Eastern Utah and Western Colorado*, University of Utah Press, Salt Lake City, 524 pp.
- Foutz, D., 1994, *Geology of Colorado Illustrated*, Your Geologist Dell R. Foutz, Grand Junction, CO, 181 pp.
- Griffitts, M. O., 1990, *Guide to the Geology of Mesa Verde National Park*, Mesa Verde Museum Association, Mesa Verde National Park, CO, 88 pp.
- Hopkins, R. and L. B. Hopkins, 2000, *Hiking Colorado's Geology*, Mountaineers Books, Seattle, WA, 240 pp.
- Matthews, V., K. KellerLynn, & B. Fox, 2003, *Messages in Stone: Colorado's Colorful Geology*, Colorado Department of Natural Resources, Colorado Geological Survey, Denver, 157 pp.
- Milito, S., 2010, A survey of fossils and geology of Red Rock Canyon Open Space, Colorado Springs, Colorado, *The Mountain Geologist*, 47(1): 1–14.
- Obee, R., 2012, *History in Stone: the Story of Red Rock Canyon*, Johnson Books, Boulder, CO, 265 pp.
- Reed, J. and E. Ellis, 2009, *Rocks Above the Clouds: a Hiker's and Climber's Guide to Colorado Mountain Geology*, Colorado Mountain Club Press, Golden, CO, 128 pp.
- Raup, O. B., 1996, *Geology Along Trail Ridge Road [of Rocky Mountain National Park]: a Self Guided Tour for Motorists*, Rocky Mountain Nature Association with Falcon Press Publishing Company, 75 pp.
- Williams, F. and H. Chronic, 2014, *Roadside Geology of Colorado*, Mountain Press Publishing Company, Missoula, MT, 416 pp.

Maps

GTR Mapping, 2013, *Colorado Geologic Highway Map and Shaded Elevation Map with 14,000 Foot Peaks: Selected Mining Districts, & Dinosaur Localities*, GTR Mapping, Cañon City, CO.

Websites

- Bob Weimer Mines Geology Trail*, Geology & Geological Engineering, Colorado School of Mines, <http://inside.mines.edu/Bob-Weimer-Trail>.
- Colorado Geological Survey, <http://coloradogeologicalsurvey.org/>.
- Colorado Geology Photojournals: a Tribute to Colorado's Physical Past and Present*, by Jeremy McCreary, <http://www.cliffshade.com/colorado/index.htm>.
- Rock Talk*, Colorado Geological Survey, <http://coloradogeologicalsurvey.org/publications/rocktalk/>.
- The What, Where, When, How and Why of Colorado's Physical Past and Present*, http://www.cliffshade.com/colorado/geo_overview.htm.

New Mexico

Books and Articles

- Chronic, H., 1987, *Roadside Geology of New Mexico*, Mountain Press Publishing Company, Missoula, MT, 255 pp.
- Goff, F., 2009, *Valles Caldera: A Geologic History*, University of New Mexico Press, Albuquerque, 128 pp.
- Hart, D., 2013, *Old Forty-Four: a Historical and Geological Excursion Over New Mexico's Old Route 44 (now part of US-550)*, Sunstone Press, Santa Fe, NM, 354 pp.
- Mack, G. and K. Giles, 2004, *The Geology of New Mexico: a Geologic History*, New Mexico Geological Society, Socorro, NM, 474 pp. [Technical]
- Price, L., 2010, *The Geology of Northern New Mexico's Parks, Monuments, and Public Lands*, New Mexico Bureau of Geology and Mineral Resources, Socorro, 372 pp.

Maps

Wilks, M. E., 2005, *New Mexico Geologic Highway Map*, New Mexico Geological Society, Albuquerque, NM

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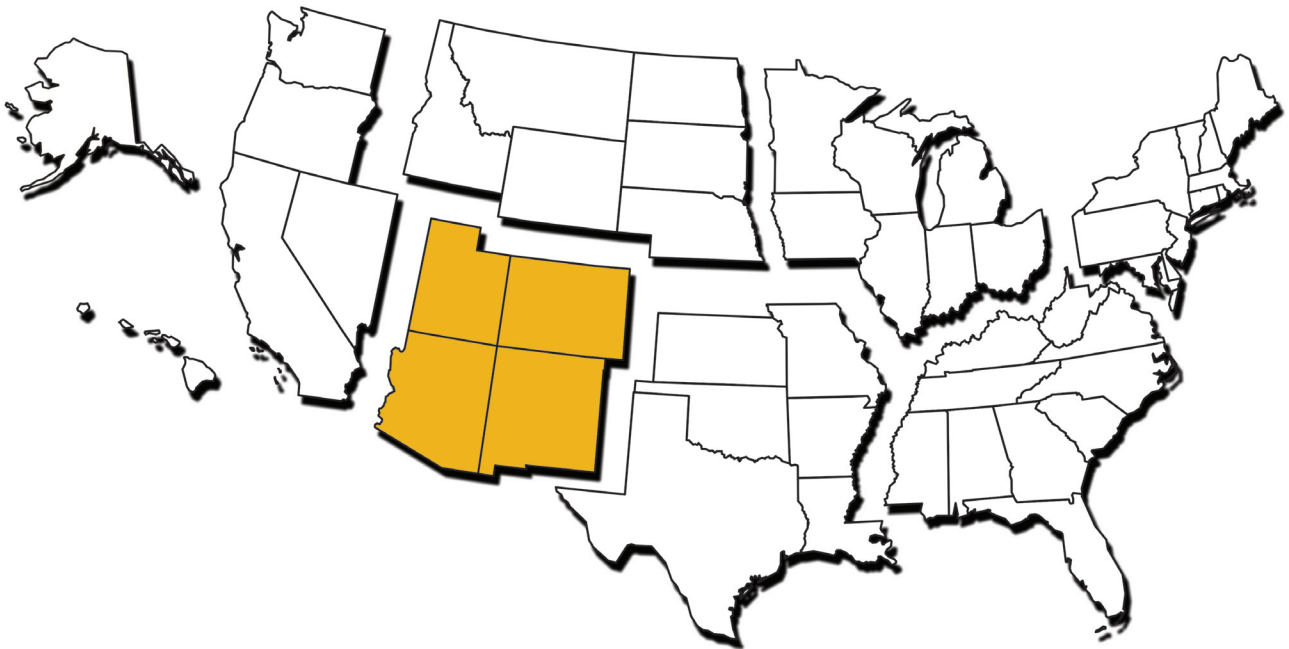
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The
Teacher-Friendly
Guide™

to the Earth Science of the
Southwestern US



Edited by Andrielle N. Swaby, Mark D. Lucas, & Robert M. Ross

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On the back cover: Blended geologic and digital elevation map of the Southwestern US. Each color represents the age of the bedrock at the surface. Adapted from Barton, K.E., Howell, D.G., Vigil, J.F., *The North America Tapestry of Time and Terrain*, US Geological Survey Geologic Investigations Series I-2781, <http://pubs.usgs.gov/imap/i2781>.