



Big Ideas

Resources

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

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

Geologic History of the Northwest Central

- Love, D., J. C. Reed Jr., and K. L. Pierce, 2003, *Creation of the Teton Landscape, 2nd revised and enlarged edition*, Grand Teton Association, Moose, WY, 135 pp. [1971 edition, by Love and Reed, is online in full, http://www.nps.gov/parkhistory/online_books/grte/grte_geology/index.htm]
- Roehler, H. W., 1992, Introduction to greater Green River basin geology, physiography, and history of investigations, *US Geological Survey Professional Paper 1506-A*, 14 pp., <http://pubs.usgs.gov/pp/1506a/report.pdf>.

Geologic History



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Trimble, D. E., 1980, The geologic story of the Great Plains: a nontechnical description of the origin and evolution of the landscape of the Great Plains, *US Geological Survey Bulletin* 1493, <http://library.ndsu.edu/exhibits/text/greatplains/text.html>. (Also paperback edition, 2000, published by Theodore Roosevelt Nature & History Association, 64 pp.)

Resources

Activities

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



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., and R. L. Bernor, 1992, *The Practical Geologist: The Introductory Guide to the Basics of Geology and to Collecting and Identifying Rocks*, Simon & Schuster, New York, 160 pp.
- Johnsen, O., 2002, *Minerals of the World*, Princeton University Press, Princeton, NJ, 439 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 & Schuster, New York, 607 pp.

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>.
- Vernon, R. H., 2000, *Beneath Our Feet: The Rocks of Planet Earth*, Cambridge University Press, Cambridge, UK, 216 pp.

Rocks of the Northwest Central

- Graham, K. L., 1996, *Rockhounding Wyoming*, Falcon Press Publishing Company (A Falcon Guide), Helena, MT, 168 pp.
- Hausel, W. D., 2009, *Gems, Minerals & Rocks of Wyoming: A Guide for Rock Hounds, Prospectors & Collectors*, W. Dan Hausel Geological Consulting LLC, Gilbert, AZ, 176 pp.
- Hodges, M., and R. Feldman, 2006, *Rockhounding Montana (2nd edition): A Guide to 91 of Montana's Best Rockhounding Sites*, Globe Pequot Press (Falcon Guides Rockhounding Series), Guilford, CT, 232 pp.
- Martin, J., and J. H. Monaco, 2007, *Fee Mining and Rockhounding Adventures in the West, 2nd edition*, Gem Guides Book Company, Baldwin Park, CA, 240 pp.
- Romaine, G., 2010, *Rockhounding Idaho: A Guide To 99 Of The State's Best Rockhounding Sites*, Globe Pequot Press (Falcon Guides Rockhounding Series), Guilford, CT, 264 pp.
- Romaine, G., 2014, *Rocks, Gems, and Minerals of the Rocky Mountains*, Globe Pequot Press (Falcon Pocket Guides), Guilford, CT, 176 pp.
- Rocks of Idaho*, <http://imnh.isu.edu/digitalatlas/geo/rocks/rocks.htm>.



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., and 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.
- Prothero, D. R., 2006, *After the Dinosaurs: The Age of Mammals*, Indiana University Press, Bloomington, IN, 362 p.
- 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, and S. S. Horenstein, 1986, *Simon & Schuster's Guide to Fossils*, Simon & 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., and 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 & Schuster, New York, 159 pp.
- Parker, S., 2007, *Fossil Hunting: An Expert Guide to Finding and Identifying Fossils and Creating a Collection*, Southwater, London, UK, 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

Fossils of the Northwest Central

- Benton, Rachel C., Dennis O. Terry Jr., Emmett Evanoff, and Hugh Gregory McDonald, 2015, *The White River Badlands: Geology and Paleontology*, Indiana University Press, Bloomington, IN, 240 pp.
- Boyd, D. W., and D. R. Lageson, 2014, Self-guided walking tour of Paleoproterozoic stromatolites in the Medicine Bow Mountains, Wyoming, *Wyoming State Geological Survey Public Information Circular 45*, 26 pp., http://www.wsgs.wyo.gov/Research/Geology/docs/Stromatolites_Guide_WSGS.pdf.
- Brosius, Liz, 2006, *Windows to the Past—A Guidebook to Common Invertebrate Fossils of Kansas*, Kansas Geological Survey (Educational Series 16), Lawrence, KS, 56 pp.
- Cvancara, A. M., 1966, Revision of the fauna of the Cannonball Formation (Paleocene) of North and South Dakota, Part 1. Bivalvia, *Contributions from the Museum of Paleontology, University of Michigan*, 20(10): 1–97.
- Cvancara, A. M., and J. W. Hoganson, 1993, Vertebrates of the Cannonball Formation (Paleocene) in North and South Dakota, *Journal of Vertebrate Paleontology*, 13(1): 1–23.
- Feldmann, R. M., and R. A. Heimlich, 1980, *The Black Hills Field Guide*, Kendall/Hunt Publishing Company, Dubuque, IA, 190 p.
- Foster, J., 2007, *Jurassic West: The Dinosaurs of the Morrison Formation and Their World*, Indiana University Press, Bloomington, IN, 416 p.
- Grande, L., 2013, *The Lost World of Fossil Lake: Snapshots from Deep Time*, University of Chicago Press, Chicago, 432 pp.
- Hagadorn, J. W., 2002, Bear Gulch: An exceptional upper Carboniferous plattenkalk, In: D. J. Bottjer, W. Etter, J. W. Hagadorn, and C. M. Tang, eds., *Exceptional Fossil Preservation: A Unique View on the Evolution of Marine Life*, Columbia University Press, New York, pp. 167–183.
- Horner, J. R., 2001, *Dinosaurs Under the Big Sky*, Mountain Publishing, Missoula, MT, 195 p.
- Johnson, K., 2007, *Cruisin' the Fossil Freeway: An Epoch Tale of a Scientist and an Artist on the Ultimate 5,000-mile Paleo Road Trip*, Fulcrum Publishing, Golden, CO, 208 pp. [illustrated by Ray Troll]
- Larson, N. L., S. D. Jorgensen, R. A. Farrar, and P. L. Larson, 1997, *Ammonites and the Other Cephalopods of the Pierre Seaway*, Geoscience Press, Tucson, AZ, 148 pp.
- Martin, J. E., and D. C. Parris, eds., 2007, The geology and paleontology of the Late Cretaceous marine deposits of the Dakotas, *Geological Society of America Special Paper 427*, 256 pp.
- National Park Service, 1980, *Agate Fossil Beds*, National Park Service (Handbook 107), Washington, DC, 95 pp.
- Smiley, C. J., ed., 1985, *Late Cenozoic History of the Pacific Northwest: Interdisciplinary Studies on the Clarkia Fossil Beds of Northern Idaho*, Pacific Division of the American Association for the Advancement of Science/California Academy of Sciences, San Francisco, CA, 417 pp.

Fossils of the States of the Northwest Central

The Paleontology Portal, <http://paleoportal.org/>. (North American fossil record and geologic and climate histories, by state).

Idaho

Fossils in Idaho: Digital Atlas of Idaho, <http://imnh.isu.edu/digitalatlas/geo/fossils/fossils.htm>.

Ross, S. H., and C. N. Savage, 1967, *Idaho Earth Science: Geology, Fossils, Climate, Water, and Soils*, Idaho Bureau of Mines and Geology (Earth Science Series 1), Boise, ID, 271 pp.

Montana

Hunt, Rebecca K., 2006, Middle Proterozoic paleontology of the Belt Supergroup, Glacier National Park, In: S. G. Lucas, J. A. Spielmann, P. M. Hester, J. P. Kenworthy, and V. I. Santucci (eds), *Fossils from Federal Lands*, New Mexico Museum of Natural History and Science Bulletin 34, pp. 57–62, http://www.nature.nps.gov/geology/paleontology/pub/fossil_conference_7/7%20Hunt%201.pdf.



Resources

Museum of the Rockies: Collections,

<http://www.museumoftherockies.org/Collections/Dinosaurs.aspx>.

University of Montana Paleontology Center, <http://www.cas.umt.edu/paleontology/>.

Wilson, G. P., W. A. Clemens, J. R. Horner, and J. Hartman, eds., 2014, Through the end of the Cretaceous in the type locality of the Hell Creek Formation in Montana and adjacent areas, *Geological Society of America Special Paper* 503, 392 pp.

Nebraska

Agate Fossil Beds National Monument, <http://www.nps.gov/agfo/index.htm>.

Ashfall Fossil Beds State Historical Park: Ashfall Animals, <http://ashfall.unl.edu/ashfallanimals.html>.

Discover your County's Fossils! A Virtual Journey Through the Paleontology Collections of the University of Nebraska State Museum, <http://museum.unl.edu/research/vertpaleo/necounties/>.

Pabian, R. K., 1970, Record in rock: a handbook of the invertebrate fossils of Nebraska, *University of Nebraska Conservation and Survey Division Educational Circular* 1, 99 pp.

Tucker, S. T., R. E. Otto, R. M. Loeckel, and M. R. Voorhies, 2014, The geology and paleontology of Ashfall Fossil Beds, a late Miocene (Clarendonian) mass-death assemblage, Antelope County and adjacent Knox County, Nebraska, USA, In: J. T. Korus, ed., *Geologic Field Trips Along the Boundary Between the Central Lowlands and Great Plains*, Geological Society of America Field Guide 36, 22 pp.

Voorhies, M. R., J. R. Bozell, G. F. Carlson, and J. Ludwickson, 1994, The cellars of time: paleontology and archeology in Nebraska. *Nebraskaland Magazine* (Nebraska Game and Parks Commission), 72(1), 162 pp.

North Dakota

North Dakota Geological Survey: Paleontology, <https://www.dmr.nd.gov/ndfossil/>. (Information on North Dakota's prehistoric life and environments, including some climate information.)

South Dakota

Badlands National Park, <http://www.nps.gov/badl/index.htm>.

The Fossils of the White River Badlands, by C. Ryan, <http://whiteriver.weebly.com/>.

Mammoth Site Geology, <http://mammothsite.com/geology/>.

O'Harra, C. C., 1920, The White River Badlands, *South Dakota School of Mines Bulletin Department of Geology Bulletin* 13, 181 pp., 96 pls.

Wyoming

Hager, Michael W., 1970, *Fossils of Wyoming*, Wyoming Geological Survey, Laramie, WY, 51 pp., <http://www.wsgs.uwyo.edu/public-info/onlinepubs/docs/B-54.pdf>.

Como Bluff and "The Bone Wars," Wyoming State Geological Survey, <http://www.wsgs.wyo.gov/public-info/guide-como-bluff>.



Resources

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Books

- de Blij, H. J., P. O. Muller, J. E. Burt, and 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 Plain*, US Geological Survey Bulletin 1493, <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.

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

- Basin and Range Physiographic Province*, National Park Service, http://www.nature.nps.gov/geology/education/concepts/concepts_basinrange.cfm. (Includes Idaho.)
- Colorado Plateaus Province*, National Park Service, http://www.nature.nps.gov/geology/education/concepts/concepts_coloradoplateau.cfm.
- OpenLandform Catalog, Education Resources, OpenTopography*, <http://www.opentopography.org/index.php/resources/lidarlandforms>. (High resolution topographic images that may be useful in teaching.)
- Rocky Mountain System Physiographic Provinces*, National Park Service, http://www.nature.nps.gov/geology/education/concepts/concepts_rockies.cfm.
- South Dakota's Physiographic Regions*, by Douglas Malo, <http://www3.northern.edu/natsource/EARTH/Physio1.htm>.
- Teaching Geomorphology in the 21st Century*, On the Cutting Edge, Strong Undergraduate Geoscience Teaching, SERC, <http://serc.carleton.edu/NAGTWorkshops/geomorph/index.html>. (A set of resources for college level, some of which may be adaptable to secondary education.)
- 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>.

State-based Resources

- No Ordinary Plain: North Dakota's Physiography and Landforms*, by John Bluemle and Bob Biek, 2007, North Dakota Geological Survey Notes 1, <https://www.dmr.nd.gov/ndgs/ndnotes/ndn1.asp>.
- North Dakota's Mountainous Areas: The Killdeer Mountains and the Turtle Mountains*, by John Bluemle, 2002, North Dakota Geological Survey Notes 15, <https://www.dmr.nd.gov/ndgs/ndnotes/ndn15-h.htm>.
- The Origin of Landscape: A Guide to Wyoming's Cultural Geology*, <http://www.wsgs.wyo.gov/public-info/cultural-geology>.



Resources

Resources

Books and Articles

- Frank, D., J. Galloway, and 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.
- Hausel, W. D., 2014, *A Guide to Finding Gemstones, Gold, Minerals, and Rocks*, Gemhunter Publications, Gilbert, AZ, 370 pp.
- Long, K. R., B. S. Van Gosen, N. K. Foley, and Daniel 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/>.
- Skinner, Brian J., 1989, Mineral Resources of North America, In: A. W. Bally and A. R. Palmer eds., *The Geology of North America—An Overview, Vol. A*, The Geological Society of America, Boulder, CO, pp. 575–584.

Websites

- Handbook of Mineralogy*, <http://www.handbookofmineralogy.org>. (Technical information on 420 minerals available as free individual pdfs.)
- Mineral Data*, Hudson Institute of Mineralogy, <http://www.mindat.org>. (Claims to be the world's largest public database of mineral information.)
- Mineral Gallery*, Amethyst Galleries, <http://www.galleries.com/>.
- Mineralogy Database*, <http://webmineral.com>.
- Mineralpedia—A Mineral Photo Database and Identification Guide*, by T. Loomis and V. Loomis, Dakota Matrix Minerals, <http://www.dakotamatrix.com>.
- Mining History Association*, <http://www.mininghistoryassociation.org/links.htm#museums>.
- The New International Mineralogical Association List of Minerals—A Work in Progress*, updated July 2015, http://nrmima.nrm.se/IMA_Master_List_2015-07.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*, by W. D. Hausel, <http://gemhunter.webs.com>.
- US Geological Survey*, <http://minerals.usgs.gov/>. (A wide range of data on mineral distribution and mining.)
- Western Mining History*, <http://www.westernmininghistory.com>.

Minerals of the Northwest Central

- Beckwith, J. A., 1972, *Gem Minerals of Idaho*, Caxton Printers, Caldwell, ID, 129 pp.
- Hausel, W. D., 2009, *Gems, Minerals & Rocks of Wyoming: A Guide for Rock Hounds, Prospectors & Collectors*, W. Dan Hausel Geological Consulting LLC, Gilbert, AZ, 176 pp.
- Hausel, W. D., and E. J. Hausel, 2011, *Gold: A Field Guide for Prospectors and Geologists (Wyoming and Nearby Regions)*, Dan Hausel Geological Consulting, Gilbert, AZ, 366 pp.
- Ream, L., 2012, *Gem Trails of Idaho & Western Montana*, Gem Guide Books, Upland, CA, 256 pp.
- Rygle, K. J., 2011, *Northwest Treasure Hunter's Gem & Mineral Guide: Where & How to Dig, Pan and Mine Your Own Gems & Minerals, 5th edition*, GemStone Press, Woodstock, VT, 200 pp.
- Wilson, Anna B., and Ed DeWitt, 1995, Maps showing metallic mineral districts and mines in the Black Hills, South Dakota and Wyoming, US Geological Survey Miscellaneous Investigations Series, Map I-2455, 72 pp., 1 map, <http://pubs.usgs.gov/imap/2445/report.pdf>.

Mineral Resources



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USGS Minerals Yearbook, Volume II—Area Reports: Domestic, State and Territory Chapters, <http://minerals.usgs.gov/minerals/pubs/state/index.html#pubs>. (State-by-state information about mineral mining and production.)

See also Resources in Chapter 2: Rocks.

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Resources

General Books on Glaciers

- Alley, R. B., 2000, *The Two-Mile Time Machine: Ice Cores, Abrupt Climate Change, and Our Future*, Princeton University Press, Princeton, NJ, 229 pp.
- Benn, D. I., and D. J. Evans, 2010, *Glaciers and Glaciation, 2nd edition*, Hodder Arnold, London, UK, 816 pp.
- Fagan, B. M., 2009, *The Complete Ice Age: How Climate Change Shaped the World*, Thames & Hudson, New York, 240 pp.
- Ferguson, S. A., 1992, *Glaciers of North America: A Field Guide*, Fulcrum Publishers, Golden, CO, 176 pp.
- Imbrie, J., and K. P. Imbrie, 1979, *Ice Ages: Solving the Mystery*, Enslow Publishers, Short Hills, NJ, 224 pp.
- Macdougall, J. D., 2004, *Frozen Earth: The Once and Future Story of Ice Ages*, University of California Press, Berkeley, CA, 256 pp.
- Ruddiman, W. F., 2001, *Earth's Climate: Past and Future*, W. H. Freeman, New York, 465 pp.
- White, C., 2013, *The Melting World: A Journey Across America's Vanishing Glaciers*, St. Martin's Press, New York, 272 pp.

General Websites on Glaciers

- Landforms of Glaciation*, by M. Pidwirny and S. Jones, 2006, <http://www.physicalgeography.net/fundamentals/10af.html>.
- Pleistocene Glaciers and Geography*, by Steven Dutch, <http://www.uwgb.edu/dutchs/earthsc202notes/GLACgeog.htm>.
- What is Glaciation? What Causes It?*, NOAA Paleoclimatology, 2003, <http://www.ncdc.noaa.gov/paleo/glaciation.html>.

Glaciers in the Northwest Central

- Ahlbrandt, T. S., and S. G. Fryberger, 1980, Geologic and paleoecologic studies of the Nebraska Sand Hills, Eolian deposits in the Nebraska Sand Hills, *US Geological Survey Professional Paper 1120-A, B, C*, 58 pp., <http://pubs.usgs.gov/pp/1120a-c/report.pdf>.
- Cannon, C., 2011, *Glaciers of Idaho*, in *Glaciers of the American West*, http://glaciers.us/glaciers-idaho#Glaical_History.
- Fountain, A. G., 2011, *Glaciers of Montana*, In: *Glaciers of the American West*, <http://glaciers.us/glaciers-montana>.
- Fountain, A. G., 2011, *Glaciers of Wyoming*, In: *Glaciers of the American West*, <http://glaciers.us/glaciers-wyoming>.
- Gilbertson, J. P., 1995, *Glaciers in South Dakota*, Division of Geological Survey, Department of Environment and Natural Resources, Vermillion, SD, <http://www3.northern.edu/natsource/EARTH/Glacie1.htm>.
- Glacial Features of North Dakota*, North Dakota State University, https://www.ndsu.edu/nd_geology/nd_glacial/index_glacial.htm.
- Glacial Lake Agassiz*, by John P. Bluemle, North Dakota Geological Survey, <http://www.dmr.nd.gov/ndgs/ndnotes/Agassiz/>.
- Glacial Lake Missoula and the Ice Age Floods*, 2005, Montana Natural History Center, <http://www.glaciallakemissoula.org/virtualtour/index.html>.
- Glaciation*, Encyclopedia of the Great Plains, edited by David J. Wishart, <http://plainshumanities.unl.edu/encyclopedia/doc/egp.pe.029>.
- Retreat of Glaciers in Glacier National Park [Montana]*, by Dan Fagre, US Geological Survey, http://nrmsc.usgs.gov/research/glacier_retreat.htm.



USGS Repeat Photography Project Documents Retreating Glaciers in Glacier National Park [Montana], by Dan Fagre, US Geological Survey, <http://nrm-sc.usgs.gov/repeatphoto/>.
Wayne, W. J., 2011, Glaciation, In: *Encyclopedia of the Great Plains*, ed. by David J. Wishart, <http://plainshumanities.unl.edu/encyclopedia/doc/egp.pe.029>.

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General Books on Energy

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- Climate Literacy & Energy Awareness Network (CLEAN)*, <http://www.cleanet.org>. (A rich collection of resources for educators).
- Envisioning Climate Change Using a Global Climate Model*, by B. Youngman, M. Chandler, L. Sohl, M. Hafen, T. Ledley, S. Ackerman, and S. Kluge, SERC Earth Exploration Toolkit, <http://serc.carleton.edu/eet/envisioningclimatechange/index.html>.
- Global Climate Change: Vital Signs of the Planet*, National Aeronautics and Space Administration, <http://pmm.nasa.gov/education/websites/global-climate-change-vital-signs-planet>. (Information about global climate change, including spectacular satellite images.)
- Global Greenhouse Gas Reference Network*, Global Monitoring Division, National Oceanographic and Atmospheric Administration Earth System Research Laboratory, <http://www.esrl.noaa.gov/gmd/ccgg/data-products.html>. (Data and visualizations.)
- Global Weather, JetStream—Online School for Weather*, National Weather Service, http://www.srh.noaa.gov/jetstream/global/global_intro.htm.
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- National Climate Assessment*, <http://nca2014.globalchange.gov>. (Reports summarizing impacts of climate change.)
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- US Map of Köppen-Geiger Climate Classification*, http://koeppen-geiger.vu-wien.ac.at/pics/KG_USA.gif.
- Weather Base*, <http://www.weatherbase.com>. (Weather and climate data by country, state, and city.)
- Weatherunderground Maps*, <http://www.wunderground.com/maps>. (A variety of types of weather maps, including surface, temperature, moisture, wind, cloud cover, precipitation.)

State- or Region-specific Climate Resources

- Changes in Streamflow Timing in the Western United States in Recent Decades*, by Michael Dettinger, US Geological Survey Factsheet 2005-3018, March 2005, 4 pp., http://pubs.usgs.gov/fs/2005/3018/pdf/FS2005_3018.pdf.
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- Climate Change Impacts: The Great Plains*, Climate Nexus, <http://climatenexus.org/wp-content/uploads/2013/06/ClimateChangeImpactsGP.pdf>.
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- The Paleontology Portal*, <http://paleoportal.org/>. (North American fossil record and geologic and climate histories, by state.)
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Resources

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General Resources for Specific Areas of the Northwest Central

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- Hydrology, Hazards and Geomorphic Development of Gypsum Karst in the Northern Black Hills, South Dakota and Wyoming*, by Jack B. Epstein, http://water.usgs.gov/ogw/karst/kigconference/jbe_hydrologyhazards.htm.
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- South Dakota Natural Disasters and Weather Extremes*, <http://www.usa.com/south-dakota-state-natural-disasters-extremes.htm>.
- Wyoming Multi-Hazard Mitigation Plan: Comprehensive Update*, 2014, Wyoming Office of Homeland Security, Cheyenne, WY, 277 pp., <http://hls.wyo.gov/library/2014mitigationplan/MITIGATIONDRAFTPLAN.pdf>. (Includes drought, climate, earthquakes, expansive soils, floods, weather, landslides, avalanches, and tornadoes.)
- Wyoming Natural Disasters and Weather Extremes*, <http://www.usa.com/wyoming-state-natural-disasters-extremes.htm>.

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Landslides

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<http://www.idahogeology.org/DrawOnePage.asp?PageID=83>.
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Radon

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

Earth Hazards Teaching Resources

- Impact of Natural Disasters on the Earth*, by J. Radke, Hamline University Graduate School of Education MnSTEP Teaching Activity Collection, <http://serc.carleton.edu/sp/mnstep/activities/19789.html>.
- 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.
- Landslide Hazards Program*, US Geological Survey, <http://landslides.usgs.gov/>.
- Natural Hazards and Risks: Hurricanes*, by L. Gilbert, J. Galster, and J. Ramage, SERC Module on Hurricane Hazards, http://serc.carleton.edu/integrate/teaching_materials/hazards/index.html.
- Radon Activities from the Alabama Radon Program*, Alabama and Auburn Universities Extension, <http://www.aces.edu/fcs/hndh/radon/alradon.php>.
- Science Serving Coastal Communities*, The National Centers for Coastal Ocean Science (NCCOS), <http://coastalscience.noaa.gov/>.
- Teaching Quantitative Concepts in Floods and Flooding*, SERC Resources for Undergraduate Students and Faculty, <http://serc.carleton.edu/quantskills/methods/quantlit/floods.html>.



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Field Geology Teaching Practices

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- Shulman, L. S., 2005, Signature pedagogies in the professions, *Daedalus*, 134(3): 52–59.
- Teaching in the Field*, National Association of Geoscience Teachers, http://nagt.org/nagt/teaching_resources/field/index.html. (Set of resources for teaching field geology.)
- Whitmeyer, S. J., E. J. Pyle, and D. W. Mogk (eds.), 2009, Field geology education: historical perspectives and modern approaches, *Geological Society of America Special Papers* 461, <http://specialpapers.gsapubs.org/content/461.toc>. (29 articles focused on undergraduate education.)

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, UK, 336 pp. (This is a current standard.)
- Compton, R. R., 1962, *Manual of Field Geology*, John Wiley & Sons, New York, 378 pp. (An old classic.)
- Compton, R., 1985, *Geology in the Field*, Wiley, New York, 398 pp. (An updated version of the previous book.)
- How to Read a Geologic Map*, Wisconsin Geological and Natural History Survey, <http://wgnhs.uwex.edu/wisconsin-geology/bedrock-geology/read-geologic-map/>.
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- Lisle, R., P. Brabham, and J. Barnes, 2011, *Basic Geological Mapping*, John Wiley & Sons, Chichester, UK, 217 pp.
- Maley, T. S., 2005, *Field Geology Illustrated, 2nd edition*, Mineral Land Publications, Boise, ID, 704 pp.
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- Spencer, E., 2006, *Geologic Maps: A Practical Guide to the Preparation and Interpretation of Geologic Maps, 2nd edition*, Waveland Press, Long Grove, IL, 148 pp.
- Walker, J., and H. Cohen, 2009, *The Geoscience Handbook: AGI Data Sheets, 4th edition*, American Geological Institute, Alexandria, VA, 316 pp.

Appendix

Resources

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

- American Association for Advance of Science, 1993, *Benchmarks for Science Literacy*, Oxford University Press, <http://www/jrpkect2-61.org/publications/bsl/online/index.php>.
- Bransford, J. D., A. L. Brown, and R. R. Cocking (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.
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On the Earth System Science of North America

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National Park Geologic Resources, <http://www.nature.nps.gov/geology/>.
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Maps (online)

- American Geological Institute, *Earth Comm 2nd edition*, Map Resources, <http://www.agiweb.org/education/earthcomm2/maps.html>. (A compilation of online map resources.)
Geologic Maps of the 50 United States, by A. Alden, <http://geology.about.com/od/maps/ig/stategeomaps/>.
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Other General Resources on Earth System Science

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Janke, P. R., 2013, *Correlated History of the Earth Chart (laminated)*, vol. 8, Pan Terra, Hill City, SD.
The Paleontology Portal, <http://paleoportal.org>.
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- Bates, R. Latimer, and J. A. Jackson, 1984, *Dictionary of Geological Terms*, 3rd edition, Anchor Press, Garden City, NY, 576 pp.
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- Neuendorf, K. K. E., J. P. Mehl Jr., and 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*, <http://agiweb.org>. (AGI is an umbrella organization representing over 40 other geological organizations.)
- 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.)
- The 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/resgi/>.
- Science in Your Backyard*, US Geological Survey, <http://www.usgs.gov/state/>. (State-by-state compilation of Earth science-related data, most of which will need to be adapted for education uses.)
- SERC (The Science Education Resource Center) K-12 resources*, <http://serc.carleton.edu/k12/index.html>. (Hundreds of classroom activities organized by grade level and topic as well as guidance on effective teaching.)
- SERC Earth Exploration Toolbook*, <http://serc.carleton.edu/eet/index.html>. (Collection of online Earth system science activities introducing scientific data sets and analysis tools.)
- Windows to the Universe*, National Earth Science Teachers Association, <http://www.windows2universe.org/>.

Science education organizations

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

Resources by State

Geologic maps of individual US states. (Digital geologic maps of US states with consistent lithology, age, GIS database structure, and format.)
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- Shaw, C. A., & B. Tikoff (eds.), 2014, *Exploring the Northern Rocky Mountains*, Geological Society of America, Boulder, CO, 303 pp.

Websites

- Columbia River Basalt Group Stretches from Oregon to Idaho*, US Geological Survey, http://volcanoes.usgs.gov/observatories/cvo/cvo_columbia_river_basalt.html.
- Craters of the Moon National Monument and Preserve, Idaho*, <http://www.nps.gov/crmo/index.htm>.
- Digital Geology of Idaho*, http://geology.isu.edu/Digital_Geology_Idaho.
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- Idaho Geology: A Convergence of Wonders*, Idaho State Board of Education, <http://idahoptv.org/outdoors/shows/geology/index.cfm>.

Montana

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- Alt, D. D., 1972, *Roadside Geology of the Northern Rockies*, Mountain Press Publishing Company, Missoula, MT, 280 pp.
- Alt, D. D., and D. W. Hyndman, 1999, *Roadside Guide to Montana*, Mountain Press Publishing Company, Missoula, MT, 432 pp.
- Raup, O. B., 1983, *Geology Along Going-To-The-Sun Road, Glacier National Park*, Glacier Natural History Association, West Glacier, MT, 62 pp.
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- Yin, A., 2004, *Structural Evolution of the Lewis Thrust System in Glacier National Park, Western Montana*, A Field Guide for Marathon Oil Company, <http://www2.ess.ucla.edu/~yin/05-Publications/papers/010-Yin-Field%20Guide.pdf>.

Websites

- Montana Bureau of Mines and Geology*, <http://www.mbm.mtech.edu>.
- Montana's Earth Science Pictures*, <http://formontana.net/>. (Run by an Earth science teacher. Includes both photos and good information.)

Nebraska

Books and Articles

- Carlson, M. P., 1993, *Geology, Geologic Time and Nebraska (EC-10)*, University of Nebraska, Lincoln, NE, 59 pp.
- Graham, J., 2009, *Scotts Bluff National Monument [Nebraska] Geologic Resources Inventory Report*, Natural Resource Report NPS/NRPC/GRD/NRR—2009/085, National Park Service, Denver, CO, 32 pp., http://www.nature.nps.gov/geology/inventory/publications/reports/scbl_gri_rpt_view.pdf.
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Websites

Geology in North Dakota: Resources for Students, Teachers, Geologists, and the Public, North Dakota State University, https://www.ndsu.edu/nd_geology/.

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South Dakota Geological Survey, South Dakota Department of Environment and Natural Resources, <http://www.sdgs.usd.edu/>.

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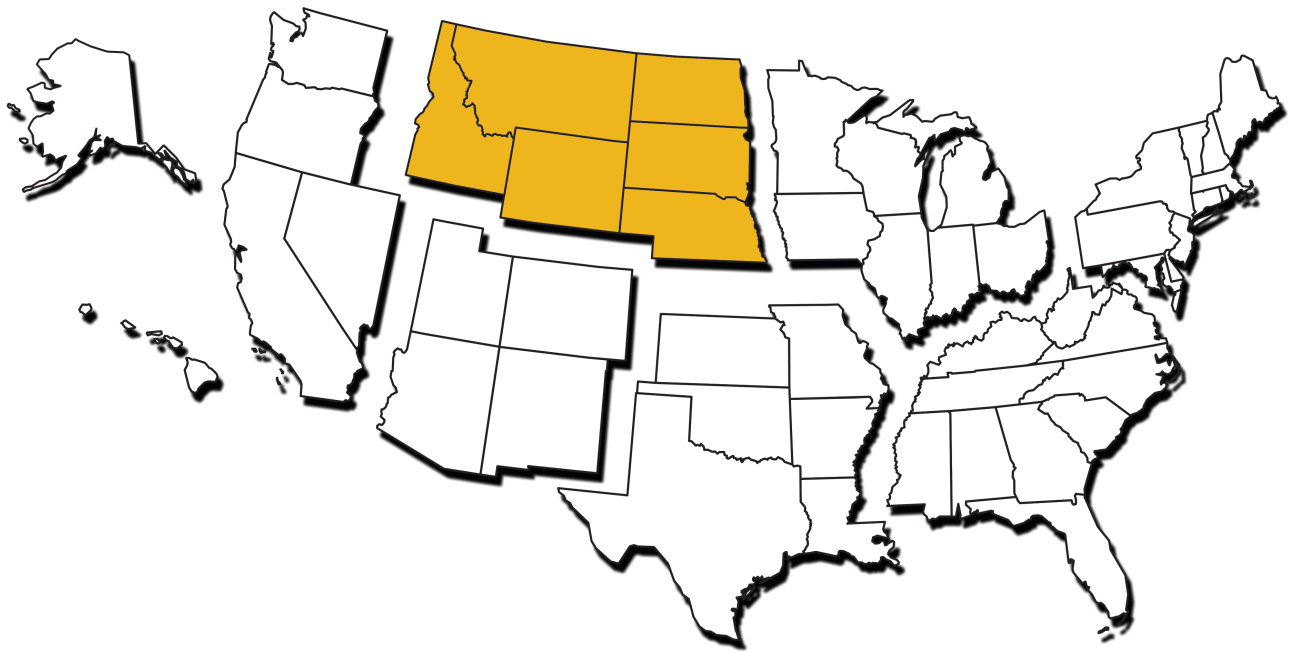


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The
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to the Earth Science of the
Northwest Central US



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