

Exploring Geology on the World-Wide Web – Volcanoes and Volcanism

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INTRODUCTION

This issue's column will focus on World-Wide Web resources for learning about volcanoes and volcanism.

All of the URL addresses in this article are available as hypertext links from Web pages the authors maintain at:

<http://www.geology.uiuc.edu/~schimmri/geology/geology.html>

and

<http://www.dc.peachnet.edu/~pgore/gore.htm>

Connecting to the resources below from these Web pages will save you a substantial amount of typing. Also, due to the lead time between the writing of this article and its publication, along with the volatile nature of the World-Wide Web, URL addresses may change periodically and the Web pages will be maintained to reflect any such changes in the resources described below.

GLOBAL VOLCANO INFORMATION

The following sites have large amounts of information about volcanoes and volcanism around the world.

Michigan Technological University Volcanoes Page

<http://www.geo.mtu.edu/volcanoes/>

One of the best places to go for volcano information. The MTU page has a worldwide volcanic reference map (color elevation map of the world with numbers for volcano locations) along with information on recent and ongoing volcanic activity, volcanic hazards mitigation, and remote sensing of volcanoes. It also has links to *Decade Volcano* information and 21 online journals related to volcanology.

Volcano World

<http://volcano.und.nodak.edu/>

This is a superb volcano site, which is supported by NASA's *Public Use of Earth and Space Science Data Over the Internet* program. One of the most useful features is the clickable world map (with red triangles for volcanoes) and list of currently erupting volcanoes, arranged by date of event. You can find a file of volcano images, volcano lesson plans, volcano news and current events, the "volcano mall" (a guide to purchasing volcano books, maps, calendars, and so

forth), and plenty of educational information including a discussion of volcanoes on Earth, Mars, and the Moon. There are links to volcanic parks and national monuments, including Hawaii, Mount St. Helens, and other places such as Yellowstone, Devils Tower, Wyoming, and Crater Lake – all superbly illustrated. You might also enjoy the "Ask A Volcanologist" feature. There is also a search function.

IAVCEI

http://xrftmac.lanl.gov/Heiken/IAVCEI_home_page

The International Association of Volcanology and Chemistry of the Earth's Interior is the focus for research in volcanology and related disciplines. It is responsible for the Decade Volcano project, for which 15 volcanoes have been nominated. It has commissions to study various topics such as mitigation of volcanic disasters, explosive volcanism, chemistry of volcanic gases, volcanoes and Earth's atmosphere, volcanogenic sediments, volcanic lakes, large volume basalt provinces, and granites.

Global Volcanism Program

<http://nmnhwww.si.edu/gopher-menus/SmithsonianGlobalVolcanismProgram.html>

This program at the Smithsonian Institution maintains a database of all known global volcanic activity over the last 10,000 years and is building a petrologic database for volcanic materials. The *Global Volcanism Network Bulletin*, a monthly newsletter covering 1994 and 1995, contains information (including seismograms, maps, and images) of volcanoes worldwide. There is also a link to the Volcano Listserv.

World-Wide Volcanism

<http://skye.gsfc.nasa.gov/wvolcano.html>

A NASA server with a full-color clickable relief map with red triangles for major volcanoes or volcanic areas. Contains information on current and recent volcanic activity, an index to volcanoes from A to Z, volcano research centers and observatories, volcanic reference and educational material, and the ever popular volcanism on other worlds ("starring" Mars, Venus, Io, and the Moon), with links to eruption images from various TOMS (Total Ozone Mapping Spectrometer) satellites.

Satellite Images

<http://www.jpl.nasa.gov/sircxsar/>

This is a NASA Web page for the joint U.S.-German-Italian Spaceborne Imaging Radar-C/X-Band

Aperture Radar (SIR-C/X-SAR) Project. The archive includes time-sequence space radar images of numerous volcanoes including Mount Pinatubo, Mount Ranier, Unzen, Mauna Loa, and Vesuvius.

Terrestrial Volcanoes

<http://hang.lanl.gov/solarsys/tervolc.htm>

Part of the series *Views of the Solar System*, the section on Earth has information on terrestrial volcanoes. This site has satellite imagery and space-shuttle photography with descriptions of many terrestrial volcanic sites (such as the Galapagos Islands and Unzen Volcano in Japan). Contains digital video (AVI format) from *Understanding Volcanic Hazards* by the IAVCEI.

The Electronic Volcano

<http://www.dartmouth.edu/pages/rox/volcanoes/elevolc.html>

A volcanic-information server at Dartmouth College where you can read an eyewitness account of the birth of Paracutin volcano in Mexico in 1943. Various types of maps (topographic, geologic, tectonic, hazard, ashfall isopachs) are available online for selected volcanoes, and information is available in six languages in addition to English.

Volcano Information Center

<http://magic.geol.ucsb.edu/~fisher/>

Information about the general features of volcanoes, eruptions, and volcanic hazards. Provides a searchable index of all articles published in the *Bulletin of Volcanology* since 1924, an index to *Geological Society of America* publications on volcanoes since 1972, and bibliographies.

Natural Hazards Mitigation Group, University of Geneva

<http://www.unige.ch/hazards/>

This site contains information on the volcano mitigation team, the Swiss disaster relief unit, and seismic hazard studies. Also has volcano images and links to other sites.

USGS Volcano Information

<http://vulcan.wr.usgs.gov/Glossary/framework.html>

An index to volcanic features and phenomena from the United States Geological Survey.

VOLCANOES IN HAWAII

Virtually Hawaii

<http://www.satlab.hawaii.edu/space/hawaii1/virtual.field.trips.html>

Virtual field trips are offered to the Big Island, as well as to Oahu, Maui, Molokai, and Kauai. Fly around the Big Island with a QuickTime or MPEG digital video and visit Kilauea, the active volcano. Take a ground tour around the crater, take a tour along the Chain of Craters Road, or take a "radar tour." Choose the places you would like to visit from

numbered points on an aerial photo. Also see "What's new?" for the latest images and descriptions of eruptions. From the researchers at the University of Hawaii, NASA, and Terra Systems, Inc. *Public Use of Earth and Space Science data over the Internet.*

Hawaiian Volcano Observatory

<http://www.soest.hawaii.edu/hvo/>

The *Volcano Watch Newsletter* is published weekly, and the archives here contain issues dating back to 1994. There are also earthquake epicenter maps for the Hawaiian Islands and the Big Island, as well as a link to Mauna Loa (Decade Volcano), and other Decade Volcanoes.

Hawaii Center for Volcanology

<http://www.soest.hawaii.edu/GG/hcv.html>

This site contains beautiful pictures from Hawaiian volcanoes with information on the latest phase of activity of Kilauea.

JASON Project VI: Island Earth

[http://seawifs.gsfc.nasa.gov/JASONM\[TML/EXPEDITIONS_JASON_6_home.html](http://seawifs.gsfc.nasa.gov/JASONM[TML/EXPEDITIONS_JASON_6_home.html)

This site provides an overview of Hawaiian volcanoes and compares them with volcanoes on Mars, Venus, and Io. Includes student interactive exercises using real-time infrared images of volcanism on Io. Also has a link to the Xerox-PARC map viewer with an interactive map of Hawaii.

VOLCANOES IN ALASKA

Alaska Volcano Observatory

<http://www.avo.alaska.edu/>

An attractive web page summarizing current volcanic activity in Alaska with weekly updates. There are links to maps, satellite images, tables, and databases.

Mount Spurr and the Dante Mission

<http://maas-neotek.arc.nasa.gov/Dante/spurr.html>

This volcano was explored by NASA's Dante II walking robot in 1994. General information about the volcano and the mission.

VOLCANOES IN THE CASCADES

USGS Cascades Volcano Observatory

<http://vulcan.wr.usgs.gov/>

Gives information on Mount St. Helens and the other volcanoes of the Cascade Range, with links to other domestic and foreign volcanoes. Contains information on volcanic hazards, volcano monitoring, the Volcano Disaster Assistance Program, volcanic emissions and global change.

Mount St. Helens, Washington

<http://vulcan.wr.usgs.gov/Volcanoes/MSH/framework.html>

Gives the history, volcanic hazards, and current activity of Mount St. Helens with links to images and real-time data from hydrologic monitoring.

Volcano Systems Center, University of Washington
<http://www.vsc.washington.edu/>

Information on Mount Ranier and the Juan de Fuca Ridge, with general information on volcano monitoring, and research activities of the faculty.

university of Miami GPS Volcano Monitoring
<ftp://corsica.rsmas.miami.edu/pub/www/tims-home.html>

Information on Global Positioning System (GPS) studies of Long Valley Caldera, California and Arenal Volcano.

EUROPEAN AND ICELANDIC VOLCANOES

Stromboli Online

<http://www.ezinfo.ethz.ch/ezinfo/volcano/strombolihomee.html>

Information on Stromboli, a volcanic island in Italy (also available in German and Italian).

C.N.R. Istituto Internazionale di Vulcanologia

<http://www.iiv.ct.cnr.it/>

An Institute in Catania, Italy with information on current activity and volcano monitoring in Sicily. Includes a clickable map of Sicilian volcanoes.

Nordic Volcanological Institute (Iceland)

<http://www.norvol.hi.is/index.html>

Includes a geologic and tectonic map of Iceland, showing active and dormant volcanoes and fissure swarms. Contains additional information in selected volcanoes including Vestmannaeyjar, which has been shown in several geology movies.

EXTRATERRESTRIAL VOLCANISM

Moon

http://volcano.und.nodak.edu/vwdocs/planet_volcano/lunar/Overview.html

An essay on *Volcanism on the Moon* describing the differences between lunar and terrestrial volcanism.

Mars

<http://cass.jsc.nasa.gov/mvolcan.html>

Viking orbiter images and text describing various Martian volcanoes from NASA's Lunar and Planetary Institute.

Venus

<http://bang.lanl.gov/solarsys/venvolc.htm>

Information about volcanoes and volcanism on Venus as revealed by NASA's Magellan radar mapping mission from *Views of the Solar System* at Los Alamos National Labs.

Io

<http://bang.lanl.gov/solarsys/io.htm>

Information about the unusual and unexpected volcanism discovered on Jupiter's moon Io by the Voyager spacecraft from *Views of the Solar System*.

VOLCANIC ASH AND WEATHER

Sites featuring information about volcanic ash and its affect on global weather patterns and climate.

Volcanoes and Global Climate Change

http://spso2.gsfc.nasa.gov/NASA_FACTS/volcanoes/volcano.html

Contains a discussion of volcanoes and global cooling and ozone depletion by NASA. Also discusses volcano monitoring.

NOAA VAFTD

<ftp://arlrisec.ssmc.noaa.gov/pub/vaftad/vaftad.html>

Volcanic Ash Forecast Transport and Dispersion (VAFTD) maps of the northern hemisphere showing the location of volcanic ash by the National Oceanic and Atmospheric Administration (NOAA).

Volcanic A s h and Aircraft

http://info.er.usgs.gov/reports/yearbooks/1992/geologic_volcanic.html

Information on volcanic ash and its effects on aircraft in Alaska from the *United States Geological Survey yearbook*,

Worldwide Weather

<http://www.met.reading.ac.uk/~brugge/index.html>

Worldwide weather news and information (including Antarctica data from 1981) with northern hemisphere volcanic-ash data, when available.

VOLCANO RESOURCE DIRECTORIES

A couple of sites that provide links to information about volcanoes and volcanism.

Surfing the Internet for Volcano Scoops

<http://aqaba.u-strasbg.fr/geosurfing/subvolcano.html>

Lists volcano menus, servers, and Web pages worldwide.

Volcanic Jump Station

<http://www.aist.go.jp/GSJ/%7Ejdehn/vjump.htm>

An alphabetical list of Web pages with volcano information.

DISCUSSION

It should be quite easy to come up with classroom exercises using the resources outlined here. Volcanoes are dramatic and visually striking wonders of nature, and have a strong impact on those living nearby, thereby introducing a human element, so most students will not need prodding to examine these sites.

An obvious classroom exercise is to have each of the students study a specific volcano in detail. Students may also learn about famous historic eruptions such as Krakatoa and Vesuvius. For most younger students, the well documented 1980 eruption of Mount St. Helens occurred long enough ago to be considered historic!

The class as a whole might keep track of one or more active volcanoes for several months and chart

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their seismicity and eruptions. If there's been a large recent eruption, students could track the volcanic ash from NOAA or the Worldwide Weather server. The instructor might also wish to lead the class on virtual field trips to Kilauea in Hawaii or Ascension Island.

As an introduction to the study of plate tectonics, it is interesting to compare and contrast the character and distribution of volcanism on Earth with volcanism on the Moon, Venus, Mars, and/or Jupiter's moon. Alternatively, one could compare and contrast Hawaiian volcanoes with those in the Cascades to see

the dramatic differences between oceanic-hotspot shield volcanoes and subduction-related composite volcanoes.

Finally, many of these sites illustrate quite nicely how the scientific study of volcanoes is multidisciplinary and encompasses the disciplines of tectonics, igneous petrology, seismology, geochemistry, remote sensing, and so on.

The next column will discuss World-Wide Web resources for learning about rocks, minerals, and crystallography.