CHAPTER 9

Where to Go from Here

Keeping Up with the Internet

You undoubtedly realize by now that the Internet is an ever changing environment in which to learn and work. Keeping up with changes in the Internet is like try to hit a moving target. New resources are constantly coming online, client software is enhanced with new features and continually rolled out tried-and-true services give way to new and exciting ways to tap into networked resources. How can you stay abreast of all the changes? Staying current with the Internet requires some of the same strategies you use to find information on the Internet. There is no one site on the Internet that will keep you up to date with new online resources. Instead, your approach will be from a variety of different angles and sources of information. In this chapter we'll investigate how to keep current with changes in the Internet and pose some ideas as to what lies ahead for the earth science Internet community.

What's New and Sites of the Week

When returning to your favorite earth science site, or any site for that matter, check for a "What's New" page. A "What's New" page runs down the most recent changes to the Web site. A good Web site administrator will always alert visitors to additions to their resources by placing either a "What's New" icon or an image beside the link and connecting you to a "What's New" page. Many World Wide Web browsers provide some means to tap into a "What's New" site directly from their browser toolbar or menu system. A "What's New" site usually is a general-purpose site, containing many links unrelated to the earth sciences. Sometimes, however, an earth-science-related link shows up in these documents. The hyperlinks change on a periodic basis depending on the source of the "What's New" document. You will have to check in often to keep up with any changes.

The Earth Science Site of the Week **(URL-http://agcwww.bio.ns.ca/misc/geores/sotw/sotw.html)**, brought to you by the Geological Society of Canada, is a good place to check on what's happening in the earth science Internet community. Each week or so, a notable earth science site is featured. A small summary of the featured site is provided with a link to the site's home page. An archive of past Earth Science Sites of the Week is also provided.

Online Resource Centers and Subject Guides

Online resource centers are Internet sites that serve as a clearinghouse of linkages to online

resources. The primary function of these sites is to offer, as best they can, a "one-stop shopping center" for digital information. Many such sites exist. For instance, in Chapter 6, "Searching the Internet," online subject guides are discussed as a place to search for Internet resources. These sites serve as a good place to keep up with changes going on with the Internet. One of the most popular, Yahoo! **(URL - http://www.yahoo.com/)**, is a great starting place, as is EINet's Galaxy **(URL - http://galaxy.einet.net/galaxy.html)**.

Publications

The Internet doesn't seem to have hurt print media too much, as the number of books and magazines devoted to the Internet has multiplied as fast as the Internet itself. Many excellent resource guides have been produced, although few specifically for earth-science-related disciplines. These guides are often alphabetical listings of Internet resources sorted by subject. Often there are sections devoted to earth science, geology, meteorology and the like. The main disadvantage with any conventional print book is that it is often out of date by the time it makes it to print. Internet sites come and go, directory structures and addresses change, and software upgrades change program capabilities. Most Internet- or computer-oriented magazines now include a section on Internet resources. Professional newsletters keep their members up to date with Internet resources of interest to them by publishing regular columns devoted to the Internet. The most recent "printed" information comes in the form of digital, online publications.

Netsurfer Digest **(URL - http://www.netsurf.com/nsd/index.html)** is a free, general-purpose online publication of news and information about the Internet. Netsurf Digest is delivered by electronic mail each week, providing the reader with electronic snippets about Internet resources. The digest is delivered in either plain ASCII or HTML format. The HTML-formatted version can be saved or read into your Web browser, giving you immediate access to hyperlinked sites. The Netsurfer Focus special issues, which delve into specific topics in more depth, are occasionally published.

Current Cites is the monthly publication of the UC Berkeley library covering various areas of information technology. Citations include electronic publications as well as conventional print books and articles dealing with Internet-related sources and topics. The publication is available via electronic mail by sending a subscription message to **listserv@library.berkely.edu** with the following in the body of the message:

sub cites <*your name*>

Electronic Newsletters like the Internet Scout Report, published weekly by the Internet Information Center (InterNic), are distributed via electronic mail and on InterNic's World Wide Web site **(URL - http://rs.internic.net/scout_report-index.html)**. This report publishes information about new Internet sites on the World Wide Web, Gopher, and many other Internet resources and services.

Electronic Discussions

Services like electronic mail discussion lists or Usenet newsgroups provide you with the most up-to-date information. Interest groups and general-purpose Internet groups keep you abreast of the latest developments on the Internet. Service-specific groups are where you turn to find out the latest goings-on in the World Wide Web, Gopher, or other Internet services. Turn to hardware- or software-product-specific groups to discuss the latest developments and changes to a particular browser, or to a program like ArcView for geographic information systems research. Some sites distribute newsletters to keep you informed about new online resources or changes in old ones.

"Net-happenings" keeps you informed as to what's new and happening on the Internet. Subscribe to the list by sending the message

subscribe <*your email address*>

to **majordomo@dsmail.internic.net**.

NEW-LIST is an email list created to announce new electronic mail lists. To subscribe send the message "SUB NEW-LIST <your name>" and mail to **listserv@vm1.nodak.edu**.

NEWNIR-L announces new international Internet resources. To subscribe send the message "SUB NEWNIR-L <your name>" and mail to **listserv@itocsivm.csi.it**.

Usenet newsgroups are particularly helpful in keeping you up to date with the goings-on of the Internet. Some newsgroups are devoted strictly to announcing new developments while others are devoted to discussing the use of particular Internet services. For instance, the "comp.internet.net-happenings" newsgroup is used to announce new Internet sites like the Forest Health page **(URL - http://www.dnr.state.mi.us/www/fmd/pest/forheal.html)**, which reports on the health of Michigan forests. Internet users are also alerted to the publishing of new electronic journals and shareware and freeware sites. The "comp. infosystems.www.announce" is devoted to announcements specifically pertaining to the World Wide Web, while the "comp.infosystems.www.advocacy" newsgroup discusses issues surrounding the use of the Web and materials published on it. The "comp.infosystems.www.
authoring.html" is a good place to turn for questions related to authoring documents for the World Wide Web.

To keep up to date with the goings-on in geoscience, you can turn to the Web for the "Geoscience Resources FAQ" file compiled by Phillip Ingram. The FAQ file is posted on a monthly basis to a number of earth-science-related Usenet newsgroups. You can obtain the most recent version of this information from the sci.answers, comp.answers or news.answers newsgroups. You can also send an electronic mail message to **mail-server@rtfm.mit.edu** with the following line in the body of the message:

send usenet/news.answers/geology-faq/geosci-resources/part1

Replace the part 1 with part 2, part 3, or part 4 for the remainder of the files. You can retrieve the same files via anonymous FTP by logging on to

rtfm.mit.edu/pub/usenet/news.answers/geology-faq/geosci-resources/part1

again replacing part 1 with the appropriate file name. A hypertext version of the FAQ file is accessible from The Virtual Earth **(URL - http://atlas.es.mq.edu.au/users/pingram/v_earth.html)** and The Soft Earth **(URL - http://atlas.es.mq.edu.au/users/pingram/s_earth.html)** Web sites.

Here, and on the Horizon: The Real and Virtual Earth

The Internet is evolving from a digital archive to an interactive environment beneath our fingertips. Interenetworking provides a means for the interactivity between humans and other humans, between humans and computers, and between computers and other computers. Many new and exciting innovations have come online recently and are slated to become more widespread in the near future. Data visualization, virtual reality, real-time audio and video are relatively new technologies that are being distributed over the Internet that will benefit the earth science community.

In Real Time: "Being There"

The desire and need for information on demand has spurred many in the earth science community to turn to the Internet as a way to receive information in real time, or as it happens. In the past, computer users were content with Gophering to a news site to read the daily or weekly postings or dropping into a government Web site to download the latest weekly or monthly data report. Now, we can receive information on demand, and in real time. Internet technology permits scientists and the general public to watch and even participate in scientific research as it happens. For instance, during the controlled flooding project on the Colorado River in 1996, the U.S. Geological Survey used satellite telemetry to distribute real-time streamflow data over the World Wide Web. On March 26, 1996, the Bureau of Reclamation opened the Glen Canyon Dam and released about 45,000 cubic feet of water for a one-week period. Four streamflow-gauging stations along the river below the Glen Canyon Dan were equipped with satellite telemetry. The USGS gave public access to the streamflow data and permitted people to follow the events of the controlled flood experiment through the **Web (URL - http://wwwdaztcn.wr.usgs.gov/floodpr.html)**. The USGS provides access to real-time hydrologic data for the United States **(URL - http://h2o.usgs.gov/public/realtime.html)**, furnishing instantaneous streamflow data in a graphical format over week-long periods (Figure 9.1).

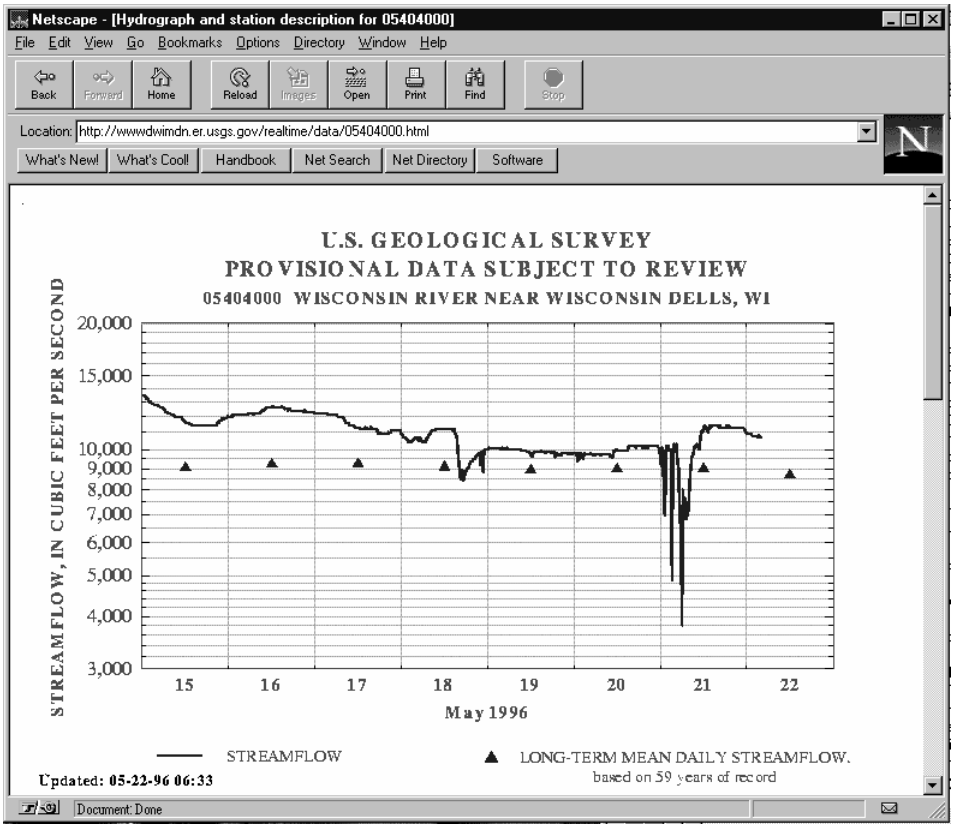

Figure 9.1 Hydrograph from USGS real-time hydrologic data site

The notion of real-time data delivery is a relative one. Although not truly in real time, many sites provide very up-to-date information or data about their projects. A case in point is the 1996 South African Everest expedition. This was the first “high tech” trek to the highest point in the world. Equipped with laptop computers and satellite telephony, the world community for the first time could experience the climb as it happened. The public had access to the climbers via Internet electronic mail. Pictures shot at the various base camps were sent via satellite uplink for distribution over the World Wide Web. Visitors to the Web site can download the first virtual reality scenes from Mt. Everest. You can almost imagine yourself walking the ice-covered slopes of Mt. Everest as you navigate around the panoramic view of base camp 2.

During the writing of this book, NASA and the *Houston Chronicle* took an exciting step toward delivering real-time information over the World Wide Web by providing live audio and video access to space shuttle mission STS 77. From the mission home page, a visitor could listen in on discussions conducted between NASA personnel and astronauts in

space. Live pictures showing the shuttle's orbit and Mission Control were broadcast each minute. A chat-back link was provided to discuss the shuttle mission and its activities. A visitor to the site now can branch off to a rich source of online space exploration via the "Space Links" **page (URL - http://www.chron.com/content/interactive/space/links.html)**.

A fun and unique distribution of real-time information over the Internet is the broadcast of live video camera views of what's happening around the world. Internet users are connecting cameras to the Internet and at predetermined time increments are snapping pictures and "instantly" distributing them across the Net. For example, KCNC Television of Denver, Colorado, distributes pictures of the mountains west of Denver from its "Mountain Cam**" (URL-http://www.kcncnews4.com/cgi-bin/citycam.exe?6)**.

Virtual Reality: Just Like Being There?

Virtual field trips were examined in Chapter 7 as a means for people to explore places without having to physically be at the location. In most cases virtual field trips are created around a series of still photographs, and the participant maneuvers through the landscape by linking from one image to another. However, over the last several years, computer programmers have created three-dimensional worlds within computers. Virtual reality "is a computer environment in which a user is immersed and can experience simulated visual, auditory and force sensations" (Ostler, 1994). Virtual worlds are "constructed" in computers; hence programmers can design these new environments in whatever fashion they like. Most virtual worlds to this point have been artificial drawings of the environment. Now, earth scientists and computer programmers are teaming up to produce realistic environments in which scientists and students alike can explore and learn about the earth. Many World Wide Web browsers now support the viewing of virtual reality modeling language files or will spawn an external viewer when a VRML file has been downloaded. A user can navigate through the virtual world. By the time this book comes to print there will be many more exciting uses of virtual reality. However, the internet earth science community is using virtual reality in a couple of different ways. First, virtual reality is used to visualize three-dimensional space. This was VR's intended purpose. Second, virtual reality is used as an interface to information. Three-dimensional models can be navigated to reveal or provide access to hyperlinked data.

NASA Intelligent Mechanisms Group personnel are providing VRML models of mission hardware and sites. Visitors can "walk" through the terrain of Kilauea volcano or examine a three-dimensional model of the Marsokhod Planetary Rover. Hyperlinks are encoded into the models at particular places. For instance, hyperlinks to online technical specifications are encoded into the components of the rover model. Clicking on a component brings up information.

The SkyView project **(URL - http://skyview.gsfc.nasa.gov/skyview.html)** from the High Energy Astrophysics Science Archive Research Center **(URL -**

http://heasarc.gsfc.nasa.gov/docs/HEASARC_HOME_PAGE.html) has designed a "Virtual Observatory" where users can retrieve images of any part of the sky at wavelengths from radio to gamma rays. Both basic and advanced interfaces to the SkyView databases over the Web are used to send a request to the SkyView server. An interactive interface for X-Windows is available too. Users define the center of the field to be retrieved, a data survey to use (e.g., digitized sky, IRAS Sky Survey Atlas, etc.), coordinates, projection, brightness, and so on. An image is processed and displayed online after the request has been submitted.

VRML Topographic Map Generator **(URL - http://evlweb.eecs.uic.edu/pape/vrml/etopo/)** is an interactive program that generates virtual reality model language topographic maps on the fly. Brought to you by the SeaWiFS project, maps are created from NOAA NGDC ETOPO-5 topographic data set for the entire earth's surface. An online fill-in form to specify the latitude and longitude, size of map in degrees, grid resolution, elevation exaggeration and map texture resolution lets you generate the desired map. The VRML map is sent down to your desktop VRML browser for viewing. You can move about the terrain as desired within the VRML browser.

The ALB Crystallography home page **(URL - http://fluo.univ-lemans.fr:8001/)** brings you the 3D Crystal Structures in the VRML **site (URL - http://fluo.univ-lemans.fr:8001/vrml/vrml.html)**, where virtual reality is used to examine inorganic crystal structures with a VRML plugin to your World Wide Web browser. Users walk around, look at and move through various crystal structures. The benefits of virtual reality technology are easily apparent when looking at this site. Visualizing structures like these is extremely difficult from a static, two-dimensional photograph. Three-dimensional models are useful in learning the configuration of crystal structures. But having the ability to manipulate them—that is, turn them over, look at them in different perspective and even get inside them—gives the user (student) a whole new way of learning.

Multimedia: Audio and Video on the World Wide Web

Although audio and video have been available over the Internet for some time, users have had to download the entire file prior to viewing it in a "helper application" running outside their Web browser. Now streaming technologies are bringing real-time audio and video to our desktops. Although video feeds can be delivered over a modem with as slow a speed as 28.8 baud, much faster modems are required to get anything approaching full motion. At lower speeds, video is choppy and audio often out of sync. However, delivering audio over the Internet has come a long way. Now, reasonably good-quality audio can be achieved at modem speeds as low as 14.4 baud. A number of audio streaming technologies have been developed, and numerous sites around the world are adopting them to add a fuller dimension to the content of their World Wide Web sites. Distribution of radio programs is a natural for the Internet. Several radio programs are being regularly archived on the Internet.

National Public Radio archives its “All Things Considered, ” “Morning Show” and “Science Friday. ”

Multimedia presentation software enables users to create dynamic presentations through the electronic melding of text, sound, images and video in digital form. Software companies are now trying to develop ways for presentation authors to distribute their creations over the Internet. Multimedia developers are enabling the distribution of their products over the Internet by “plugging into” existing Internet browser programs. Plugins enabling the full functionality of the original multimedia presentation have been developed for macromedia products like Director and Asymetrix’s Toolbook. Microsoft’s Power Point can be configured to export presentations as HTML documents.

⌖ Focus on the Internet: *Computer Oriented Geological Society*

The Computer Oriented Geological Society **(URL - http://www.csn.net/~tbrez/cogs/index.html)**, otherwise known as COGS, was founded in 1982 and is dedicated to helping geologists and other geoscientists using computers. COGS provides a forum for geologists to exchange ideas and experiences with colleagues about their use of computers for research and education. COGS functions as a clearinghouse, providing information about software, hardware and data sets via the COGS bulletin board service (COGSnet) and a newsletter (COGSletter) and participates in larger computer information networks like GeoInfoNet (Bresnahan, 1994). COGS uses the World Wide Web to distribute information about the society and provide an interface to its various functions and services. COGS information and data can be retrieved from its FTP file server through conventional mail order services.

The COGSletter keeps members of the society up to date with developments such as geological data, data sets distributed on CD-ROM and book reviews. Back issues of COGSletter can be read online. Advertisements by commercial software and hardware vendors are also included.

COGS and the Society for Mining Metallurgy and Exploration (SME) cooperatively sponsor the computer bulletin board COGSnet. COGSnet is a stand-alone system accessible by telephone lines through a modem. You do not have to be a member of the society to access the message area and software downloads. Nonmembers have more restricted file access and more limited connect time than do members of COGS or SME. The message areas are a good place to drop in for conversation with like-minded geoscientists. The chat areas are a good place to extend your professional network and keep up to date with the latest happenings in the geosciences. COGSnet maintains an extensive field archive for its members. Nonmembers have limited access to the archived files. Data sets, games, computer utilities and other public domain programs also are available, as is an index to files archived by the COGSnet site.

What You Have Learned

- You can keep up with changes with the Internet by employing a multiple resources strategy.
- The most up-to-date information on the Internet can be obtained from electronic newsgroups and online publications.
- The Internet is capable of providing real-time data to users.
- Virtual reality is employed over the Internet to take users to places they physically cannot reach or view things they typically cannot see in reality.
- True multimedia is accomplished over the Internet via browser plugins for presentation software and audio/video compression schemes.

Try It Out!

1. Get tuned in. Download an Internet audio program or plugin for your World Wide Web browser. Once you are configured, a good place to visit to catch up with science news is National Public Radio's "Science Friday" show **(URL - http://www.realaudio.com/contentp/npr/scifri.html)**.

2. Check out the rain forest of Central America by connecting to the "MayaQuest" home page **(URL - http://www.mecc.com/mayaquest.html)**. Before doing so, make sure you're using a World Wide Web browser that supports VRML and Macromedia Shockwave to achieve the full experience of this site.

3. "Visit" the mountains west of Denver with KCNC Televsion's "Mountain Cam**" (URL - http://www.kcncnews4.com/cgi-bin/citycam.exe?6)**. How well you can see the mountains is affected by the air's visibility. Visibility refers to the horizontal extinction of light. Sulfate aerosols and particulates are air pollutants that reduce visibility. Air pressure systems also impact visibilty. Visibility tends to be poor under the influence of high pressure, which inhibits vertical dispersion. How is the visibility west of Denver? What are (were) the weather conditions at the time of observation? Do you think the weather at the time of your observation had any effect on the visibility?