

THE DIGITAL DOMAIN NO. 5:

Selected Internet Visual Resources for the Study of British Columbia: Cartography, Remote Sensing and GIS

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This compilation, the second of three parts (see also “The Digital Domain No. 3: Art, Photography, and Multimedia”), lists publicly accessible Web sites documenting cartographic, remote sensing (satellite and aerial photography), and geographic information systems (GIS) resources for the study of British Columbia. In addition to Web sites on cartography and GIS, selected free software for creating, viewing, or interacting with maps or for reading documentation produced in the Adobe Portable Document Format (PDF file) is listed last.

Due to the enormous number of Web sites on cartography, readers are cautioned that this listing is highly selective and a mere sampling of some of the more significant Web sites. Any one of the guides, particularly *Oddens' Bookmarks* from Utrecht University, should be consulted for more in-depth listings. Readers interested in non-Web resources relating to cartography or GIS should consult one of the subject guides or directories for electronic mailing lists and Internet or Web newsgroups.

All references in this bibliography are to Web sites whose URL (Universal/Uniform Resource Locator) or Internet address always begins with `http://`. Because the URL must include the Internet protocol designator, we have shown the Internet protocol designator. The two most popular graphical Web browsers, Microsoft Internet Explorer and Netscape Navigator, both default to a Web URL when the Internet protocol designator is not included. Those accessing the Internet through a proxy server or who have high-security browser settings may encounter problems with some of these resources.

The resources are organized alphabetically within each division by the author of the Web site content, or by Web site title. Government

sites are grouped together by country, province, or state. Most Canadian government sites offer bilingual services. The URLs are underlined since that is the default display mode in many Web browsers. There is no full stop (period) at the end of the URL because this punctuation mark is often part of the URL.

Due to the evolving nature of the Internet and the Web, links within many of these sites may be obsolete. The URLs listed below are current as of 1 January 2001. Readers are encouraged to review earlier listings, especially "The Digital Domain No. 2" (*BC Studies* no. 121, Spring 1999; online at <http://www.bcstudies.com/>) which includes several map-based databases. The previous "Digital Domain" was published in *BC Studies* no. 125-126 (Spring/Summer 2000). Except where URLs have changed, government programs reorganized, or significant new content introduced, information is not repeated from earlier listings.

DIRECTORIES AND GUIDES

There are several cartography and GIS magazines offering links to Web resources. None of these periodicals are listed here; they can all be located via Utrecht University's *Oddens' Bookmarks*.

British Cartographic Society. *A Directory of UK Map Collections*.

<http://www.cartography.org.uk/Pages/Publicat/UKdir/UKDir.html>

Compiled by the society's Map Curators' Group, this is the 4th edition of the guide. Collection descriptions include e-mail and Web site addresses where available. The guide is organized by type of agency and private institution. There is a hypertext index by geographic name and a subject and map-type index (Index to Special Collections).

Campbell, Tony. WWW Virtual Library: Map History / History of Cartography: The Gateway to the Subject.

<http://ihr.sas.ac.uk/maps/>

Edited by the map librarian of the British Library, this is a well-organized and comprehensive guide to the history of mapping. The site includes an alphabetic index of all site pages and a site map.

ETH Library (Zurich). Map Collection. The World of Maps.

<http://www.maps.ethz.ch/maps3.html>

Edited by Swiss map librarians, this is one of the most important Web sites providing links to digital maps and GIS data.

GeoComm International Corporation. GeoCommunity.

<http://www.geocomm.com/>

One of the best commercial guides to GIS Internet resources and data. Includes a data catalogue and free downloads via the GIS Data Depot (<http://www.gisdatadepot.com/>), GIS software, career information, and GIS news. Site-

specific and Internet GIS search engine. Other important and comparable GIS guides and directories are Adams Business Media Company's GeoPlace.com (<http://www.geoplace.com/>) or GISWorld (<http://www.gisworld.com/>); GISLinx.com: Categorized List of GIS Sites (<http://www.gislinx.com/>) with a top-level category of *Canadian GIS*; and Harvard Design and Mapping's GISPortal or Great GIS Net Sites (<http://www.gisportal.com/>).

GeoConnections: Canada's Geographic Information on the Internet.

<http://www.geoconnections.org/>

This umbrella Web site was established to "develop the Canadian Geospatial Data Infrastructure (CGDI), which will coordinate Canada's numerous databases of geographic information and make them accessible through a common window on the Internet." Information surrounding cartography and GIS throughout Canada is tracked through the various sections: Find Data, Projects & Demonstrations, Opportunities, Partners, Policy Thrusts, Publications, and GeoConnections Forum. Information about GeoConnections itself is found in New User and What's New. Site-search engine and online help.

GeoWeb Interactive. GeoJava Corner.

<http://www.ggrweb.com/geojava/index.html>

Large assortment of Java-based Web sites for the geographic sciences, along with resource links for the Java programming language.

University of Colorado at Boulder. Department of Geography. The Virtual Geography Department.

<http://www.colorado.edu/geography/virtdept/contents.html>

Instructional Web site with tutorials and lesson plans for teaching various aspects of the geographic sciences. All content is contributed by experts from around the world. Site is also linked to *Internet Resources for Geographers* (<http://www.colorado.edu/geography/virtdept/resources/contents.htm>) which is also hosted by the university.

University of Iowa. Center for Global & Regional Environmental Research. NetSurfing: Maps and References.

http://www.cgrer.uiowa.edu/servers/servers_references.html

This site contains a very useful selection, with BC content, of interactive maps, historical map collections, and mapping tutorials.

University of Minnesota. John R. Borchert Map Library. Map Libraries on the World Wide Web.

http://www-map.lib.umn.edu/map_libraries.html

Directory to map library organizations and individual libraries by geographic location and name.

Utrecht University. KartLab. Oddens' Bookmarks.

<http://oddens.geog.uu.nl/index.html>

The largest categorized, searchable guide on this topic with over 12,000 cartographic links (1 January 2001). The site name is in honour of Roelof P. Oddens, the head map curator. Jeroen Bosman, a geography subject librarian

at the university's Uithof Library Centre, also maintains Geosource (<http://www.library.uu.nl/geosource/>). His site offers fewer, but equally well organized, links to the cartography and geography.

INDIVIDUAL SITES

Aerial Images, Inc. TerraServer.com.

<http://www.terraserver.com/>

Satellite imagery from commercial and government satellites, along with aerial photography, can be searched by place name or geographic coordinates. As with the Space Imaging Corporation's products, which TerraServer.com also markets, some satellite imagery, including Vancouver, is available down to a one meter resolution from the Orbital Imaging Corporation (ORBIMAGE) satellites. TerraServer.com images are also retrievable through the Microsoft TerraServer site. Interactive image viewing requires a free software download.

Altea Antique Maps and Books.

<http://www.antique-maps.co.uk/>

Commercial vendor of antiquarian maps; online catalogue with sample images and descriptions. Site includes a link to a listing of other London antiquarian map shops, many with Web sites of their own.

Association of Canadian Map Libraries and Archives.

<http://www.sscl.uwo.ca/assoc/acml/acmla.html>

In addition to publicizing its organizational history and activities, the site provides links to Canadian map libraries and archives, as well as thumbnails of the facsimile map series and colour bird's-eye view series reproduced by the ACMLA.

Association for Geographic Information and University of Edinburgh, Department of Geography. *AGI Online GIS Dictionary*.

<http://www.agi.org.uk/pag-es/dict-ion/dict-agi.htm>

Look up GIS and cartographic terminology by category or word search.

British Columbia. Land Use Coordination Office. Geographic Information Service (GIS).

<http://www.gis.luco.gov.bc.ca/>

This Web site provides access to downloadable GIS datasets pertaining to land and marine resource management. Some of these maps are also available for online viewing. An online *Guide to Spatial Land and Resource Information in LRMP* details the use and types of mapping utilized for land and resource management planning. GIS maps generated during the LRMP process can be viewed online.

British Columbia. Ministry of Aboriginal Affairs.

<http://www.gov.bc.ca/aaf/>

This site and the independent British Columbia Treaty Commission (<http://www.bctreaty.net/>) contain numerous maps pertaining to land claims and treaty negotiations.

British Columbia. Ministry of Agriculture, Food and Fisheries.

1. BC Soils Information Project.
<http://www.bcsoils.gov.bc.ca/>
 BC SIP digital maps can be located and downloaded through a clickable map interface organized on the National Topographic Series (NTS) grid system. Selected Canada Land Inventory digital files on BC soils are also available for download.
2. Fisheries Inventory.
<http://www.bcfisheries.gov.bc.ca/fishinv/>
 Contains links to *FishWizard* (<http://pisces.env.gov.bc.ca/FishWizard.asp>), a joint project of BC Fisheries and Fisheries and Oceans Canada which generates a map of fish-related data based on user-selectable attributes; the Fisheries Information Summary System (FISS) which includes maps; downloadable portions of the Watersheds BC atlas (see the listing below for the British Columbia Ministry of Environment, Lands and Parks); and a specialized mapping tool for use by fisheries inventory contractors.
3. FishInfo BC (Fisheries Project Registry, Fisheries and Oceans Canada and the BC Fisheries).
http://www.canbcfpr.pac.dfo-mpo.gc.ca/fpr/Qf_Welcome_dev.asp
 Database of jointly managed fisheries projects. Results are displayed on both a GIS map with zoom controls and hyperlinks to the database records, and as a database record. Hyperlinked fields within the database record produce further results, including a more detailed map of any project.
4. Land Reserve Commission.
<http://www.lrc.gov.bc.ca/lrc/lrchome/lrchome.htm>
 The commission is in the processing of digitizing agricultural land reserve maps; no online maps are available as of 1 January 2001.
5. Useful Maps.
<http://www.agf.gov.bc.ca/resplan/maplist.htm>
 A selection of maps relating to agriculture; quality and resolution varies.

British Columbia. Ministry of Energy and Mines. Geological Survey.

1. Bedrock Mapping.
<http://www.em.gov.bc.ca/Mining/Geosurv/bedrock/default.htm>
 Downloadable geological maps require the Autodesk WHIP! Viewer browser plug-in (see below under Software).
2. The Map Place.
 New URL: <http://www.em.gov.bc.ca/Mining/Geosurv/MapPlace/default.htm>
 In addition to features described in "The Digital Domain No. 2", *BC Studies* no. 121 (Spring 1999), *The Map Place* includes a geological map of the Barkerville area. Landsat satellite imagery and 3D terrain were also introduced as data layers in 1999 and 2000.
3. Surficial Geology and Hazards Mapping.
<http://www.em.gov.bc.ca/mining/geosurv/surficial/>
 A series of detailed Greater Victoria earthquake hazards maps are available at this site, along with a description of the aggregate (sand and gravel) survey

project and its maps; geological maps from a joint federal-provincial study of the Nechako region; and a link to the Digital Terrain Map Library (<http://www.em.gov.bc.ca/Mining/Geolsurv/TerrainMapLibrary/Default.htm>) with downloadable terrain and slope stability maps in digital format.

British Columbia. Ministry of Environment, Lands and Parks.

1. BC Geographical Names Information System.
New URL: <http://www.gdbc.gov.bc.ca/bcnames/>
See also "The Digital Domain No. 2", *BC Studies* no. 121 (Spring 1999).
2. Geographic Data BC.
<http://home.gdbc.gov.bc.ca/>
Formerly the Surveys and Resource Mapping Branch, this program is responsible for land- and aerial-based survey systems. Commercially available digital maps such as the BC Digital Atlas are also searchable through LandDataBC (<http://www.landdata.gov.bc.ca/>). A new GIS product which may be released in 2001 is the Watersheds BC atlas (<http://home.gdbc.gov.bc.ca/WatershedsBC/Default.htm>). A digital road atlas is also in preparation. Free digital maps in a variety of graphic file formats and levels of complexity can be downloaded.

British Columbia. Ministry of Forests.

<http://www.gov.bc.ca/for>

The Subject Index is the easiest way to locate all map products and information available from this ministry. Select "Map" in the index as Type of Publication. Listed below are some of the more important individual map sites.

1. Forest Practices Branch. Forest Service Recreation Maps.
<http://www.for.gov.bc.ca/hfp/rec/maps/svanisle/index.htm>
Includes several high-resolution interactive maps along with two-dimensional Web page maps and Adobe PDF files.
2. Research Branch.
<http://www.for.gov.bc.ca/research/>
This branch, as its name implies, conducts forestry research projects, many of which depend on or produce mapping products. One such project is EcoGen (<http://www.for.gov.bc.ca/research/ecogen/>) which is described as a "predictive ecosystem mapping tool"; it is a free software download for the Windows platform. The Biogeoclimatic Ecosystem Classification (BEC) Web site (<http://www.for.gov.bc.ca/research/becweb/becinfo/index.htm>) also offers maps and mapping tools.
3. Resources Inventory Branch. WebIGDS.
<http://www.for.gov.bc.ca/resinv/reports/webigds.htm>
Web-based map tool for displaying descriptive information (metadata) about more than 7,000 forest cover maps.

British Columbia Archives. Cartographic Records.

<http://www.bcarchives.gov.bc.ca/cartogr/general/maps.htm>

This portion of the BC Archives Web site is still in a pilot project stage. The site features a partial catalogue of cartographic records, full-text cartographic finding aids and digital samples of maps.

Canada. Environment Canada.

<http://www.ec.gc.ca/>

An indispensable Web site for information on environmental conditions and climatic change. The department's Pacific and Yukon Region Web site (<http://www.pyr.ec.gc.ca/>) contains information and maps specific to BC such as the Georgia Basin Ecosystem Initiative (http://www.pyr.ec.gc.ca/GeorgiaBasin/gbi_eIndex.htm). This department also hosts the Millennium Eco-Communities Web site (<http://www.ec.gc.ca/eco/>) which contains an Internet resource catalogue in support of local environmental activities.

Canada. Inter-Agency Committee on Geomatics. *Canadian GIS Source Book*.

<http://cgdi.gc.ca/iacg/gis/index.htm>

Compilation based on a national survey of federal, provincial and municipal GIS projects. The Web site was superseded by GeoConnections, but is of historic interest. The link to the source book from the IACG's own home page (<http://cgdi.gc.ca/iacg/homeiacg.htm>) no longer works. Also of historic interest is the IACG's *Report On Current Status and Trends In Federal Digital Geographic Data in Canada* (May 1991) (<http://cgdi.gc.ca/iacg/report/report/fdgd.htm>).

Canada. Natural Resources Canada. Canada Centre for Remote Sensing (CCRS).

<http://www.ccrs.nrcan.gc.ca/>

Canadian Earth Observation Network (CEONet).

<http://ceonet.ccrs.nrcan.gc.ca/>

See also "The Digital Domain No. 2," *BC Studies* no. 121 (Spring 1999). CEONet is the most important direct access point for Canadian and non-Canadian mapping and remote sensing data and publications. The Web site now includes a new search interface with the ability to search by a clickable map (Earthscape II, a Java application), geographic coordinates, or keyword; integrated searches with the Canadian Geographical Names Database are also possible. Free Web site map creation tools and documentation based on CEONet software are available. Among the CCRS' educational offerings is an online tutorial *Fundamentals of Remote Sensing* (<http://www.ccrs.nrcan.gc.ca/ccrs/eduref/tutorial/tutore.html>).

Canada. Natural Resources Canada. Geological Survey of Canada.

The GSC's Pacific Division (http://www.nrcan.gc.ca/gsc/pacific/gsc-pacific_e.html) consists of the Vancouver office (http://www.nrcan.gc.ca/gsc/pacific/vancouver/index_e.htm) and the Sidney Subdivision or Pacific Geoscience Centre (<http://www.pgc.nrcan.gc.ca/>).

Most of the sites listed below are also grouped together on at least two other Web pages:

Natural Resources Canada, Earth Sciences Sector, Educational Material:
http://www.nrcan.gc.ca/ess/education_e.html

Natural Resources Canada, Geological Survey of Canada, Terrain Sciences Division: <http://iss.gsc.nrcan.gc.ca:80/tsdsrv/tsd2.asp>

1. GeoMap Vancouver.
<http://sts.gsc.nrcan.gc.ca/page1/urban/geomap/>
Consists of a detailed, clickable geological map of Greater Vancouver hyper-linked to text and photographs illustrating the region's geology.
2. Geoscape Vancouver: Living with Our Geological Landscape.
<http://iss.gsc.nrcan.gc.ca/page1/urban/geoscape/geoscape.htm>
Similar to *GeoMap Vancouver* but with different content, this site documents Greater Vancouver's geological history through interactive maps, photographs and essays.
3. GeoServ.
<http://www.geoserv.org/>
The first of a digital map, *Surficial Materials of Canada*, is available for free download. As of 1 January 2001, there are three interactive map-based applications: *Mapping Ancient History*, the *National Permafrost Database*, and *Canadian Landscapes*. The first application is linked to the Canadian Museum of Civilization's Canadian Archaeological Radiocarbon Database and plots the location of radiocarbon-dated archaeological sites in North American (chiefly Canada and Alaska). Detailed information about each site is also available and maps can be selected by time periods ranging from 1,000 to 18,000 years past. The permafrost database, as its name suggests, is a climatic map based on temperature and soil records compiled over the past three decades. *Canadian Landscapes* consists of a selection of photographs depicting geological formations.
4. GSC Map Gallery.
<http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/o?path=geosmrsid.txt&id=webuser&pass=&OK=OK>
Searchable database of GSC maps in various media. Searches can be conducted by province name. Some result sets include digitized maps with clickable regions that can be zoomed into at high resolution.
5. ResSources GSC
<http://www.rgsc.nrcan.gc.ca/>
This site documents GSC research and data-representation projects, many of which are map-based.
6. Vancouver's Landscape.
<http://sts.gsc.nrcan.gc.ca/page1/urban/vanland/>
A clickable map of photographs taken at specific points in Greater Vancouver, along with a three-dimensional black-and-white computer-generated map based on BC Ministry of Environment, Lands and Parks Terrain Resource Inventory Map (TRIM) data.

Canada. Natural Resources Canada. Geomatics Canada.

1. Centre for Topographic Information, Ottawa.
<http://maps.nrcan.gc.ca/main.html>
This is the current name of the office that researches and produces aerial photographs and topographic maps. Searches for National Topographic Series (NTS) maps can be conducted a variety of ways. One of its research and development projects, Cartographic Visualization on the Internet, is accessible

through its home page. An online version of the publication, *Maps 101: Topographic Maps, the Basics*, is also available.

2. Centre for Topographic Information, Sherbrooke. Toporama.
<http://toporama.cits.nrcan.gc.ca/>
Interactive map-based application to locate, view and order National Topographic Series map sheets. As of 1 January 2001 maps are available between 1:1,000,000 and 1:50,000.
3. Geodetic Survey Division.
<http://www.geod.nrcan.gc.ca/>
This office carries out various types of surveys that are translated into maps and oversees spatial reference information standards including satellite-based global positioning systems.
4. GeoGratis.
<http://geogratias.cgdi.gc.ca/>
Geographical data in the form of maps, satellite images and data files (tables) is available for free download. The Canada Land Inventory is now part of this site and includes an online mapping service (<http://geogratias.cgdi.gc.ca/CLI/frames.html>).

Canada. Natural Resources Canada. *The National Atlas of Canada Online*.
<http://www-nais.CCRS.NRCAN.GC.CA/>
Complete online version of this essential work for understanding Canada's geography and its impact on our history. Site features the ability to create maps online and easy access to free ready-made maps of the Canada, its provinces and territories, and the world. Teaching and learning tools, including links to educational resources on other Web sites, are also available. The Canadian Communities Atlas Project is a grassroots public/private sector joint project allowing K-12 students to utilize *National Atlas of Canada* and Statistics Canada data while learning geography, GIS and profiling their communities for a Web site. Carto Corner is an online tutorial on cartography.

Canadian Geographic Online. *Mapping Canada*.
http://www.canadiangeographic.ca/mapping/default.asp?section=_mappingcanada
Review Canadian history via maps that change as you click on a timeline.

Canadian Institute of Geomatics.
<http://www.cig-acsg.ca/>
Founded in 1882, this association represents "geomatics professionals, technologists and technicians" and students. The major feature of this site is the "Significant Dates in Canadian Surveying History," a set of pages organized by date, by individual name, and by topic.

Cartography Associates. David Rumsey Collection.
<http://davidrumsey.com/>
Digital collection "primarily on cartography of the Americas from the 18th and 19th centuries." Maps may be viewed with a Web browser or through a downloadable Java client. Over 2,000 maps are fully catalogued and searchable a variety of ways. The image viewer allows for a variety of manipulations. Online help.

Central Pacific Railroad Photographic History Museum. Central Pacific Railroad Maps.

<http://www.cpr.org/Museum/Maps/index.html>

A collection of and links to high-resolution maps of the CPRR, other trans-continental railway lines, and general historical geographic maps of North America.

Environmental Systems Research Institute, Inc. (ESRI). ARC Data Online.

<http://www.esri.com/data/online/>

Maps can be created online and downloaded. ESRI also offers a free map viewer for use with its ARC line of Geographic Information System software (see below under Software).

Geomatics Industry Association of Canada.

<http://www.giac.ca/>

Site includes links to other related Web sites under Information Products: Other Links, Information Products: Member Firms Links, and in the online version of the *Canadian Geomatics Source Book*.

MapQuest.com, Inc. MapQuest.

<http://www.mapquest.com/>

Very similar features to Vicinity Corporation's MapBlast!, including wireless access to maps. The accuracy of the address search and map display is better than on MapBlast! The MapQuest address location maps also contain colour elements documenting building locations and geographic features.

Maps a la carte, Inc. Topozone.

<http://www.topozone.com/>

Every US Geological Survey map for the US at scales between 1:100,000 and 1:24,000 can be searched by place and/or state name or geographic coordinates and viewed online. Viewing scales are between 1:200,000 and 1:25,000 with a resizable viewing window. Some BC content can be searched by geographic coordinates and viewed at the 1:100,000 and 1:200,000 scales.

Maptech, Inc. MapTech.

<http://www.maptech.com/>

Free US topographic, marine and aeronautical maps and charts, as well as coastal navigation (aerial) photographs. All searches are only available via state and US place names. The maps are based on US Geological Survey data. The topographic maps can be viewed at scales of 1:24,000, 1:100,000, and 1:250,000. The topographic maps and aeronautical charts do not cover Canadian territory; the aeronautical charts, however, may include Canadian references. The nautical charts and navigational photos from the US National Oceanic and Atmospheric Administration, itself an important source of cartographic data, include BC content; see separate listing below.

McMaster University. Library. Lloyd Reeds Map Collection. Rare Maps Held in Research Collections.

<http://www.mcmaster.ca/library/maps/rchome.htm>

Descriptions of maps with indexes by place, title, cartographer, and date; some descriptions include hyperlinks to online images.

Microsoft. TerraServer.

<http://terraserver.microsoft.com/>

US Geological Survey maps of the US and portions of Canada and satellite imagery from selected global areas are available via a map interface with zoom and pan control, by place name, or by geographic coordinates. Microsoft's TerraServer is integrated with *Encarta*, Microsoft Network's online encyclopedia, and Aerial Images, Inc.'s TerraServer.com.

National Archives of Canada. *Canada at Scale: Maps of Our History*.

http://www.archives.ca/05/0514_e.html

This virtual exhibit presents Canadian cartographic history through a selection of some of the most significant maps depicting Canada dating back to 1508. There are two image galleries: "Exploration, colonization, and settlement" and "Government cartography," as well as an index listing all the maps. The thumbnails can be displayed full screen, but not at high magnification.

National Geographic Society. Map Machine.

<http://www.nationalgeographic.com/resources/ngo/maps/index.html>

Create dynamic maps with zoom and pan controls that can be keyword-searched. Maps can be e-mailed, printed or saved. Includes links to the NGS's own atlas maps, Internet cartographic and GIS resources.

National Library of the Netherlands and British Library. Collections: Gallery. Digital Atlases.

<http://www.kb.nl/kb/menu/gal-atl.html>

The *Atlas van der Hagen* (ca. 1690) contains digitized, high-resolution, downloadable images of the world as it was then known and imagined. A search interface is available and the site offers bilingual access in Dutch or English. World maps and views of the Americas are in volumes one and four.

Ruderman, Barry Lawrence. Old Historic Maps & Prints.

<http://www.raremaps.com/>

Based out of a gallery/storefront in California, this site maintains a large number of online map images with descriptions, all of which are for sale. Many examples depict the Pacific Northwest region of North America, Alaska and BC.

Simon Fraser University Library. Map Collection.

<http://www.lib.sfu.ca/kiosk/swovelan/geography/mapcoll.htm>

Single page description of SFU Library map holdings with a link to the Natural Resources Canada Canadian Geographical Names Web site.

Space Imaging Corporation.

<http://www.spaceimaging.com/>

This company's Ikonos satellite produces imagery down to one meter resolution available for viewing or purchase through its CARTERRA online store. Use of the online store with its free GIS map features requires installation of a Java applet. The CARTERRA catalogue also identifies other satellite imagery for preview and purchase. An image gallery displays some of the more spectacular scenes from space. Some satellite imagery is marketed through Aerial Images, Inc.'s TerraServer.com site.

The Trans Canada Trail in British Columbia.

<http://www.sfu.ca/tct/tctrail.html>

Hosted by Simon Fraser University, this Web site features two-dimensional and interactive three-dimensional maps of the trail, along with links to other Web sites about trails in BC.

United States. Geological Survey.

1. EarthExplorer.

<http://earthexplorer.usgs.gov/>

Part of the USGS Global Land Information System (GLIS), EarthExplorer is a front-end database for ordering USGS GIS products such as satellite images, aerial photographs, and maps. Full access requires registration, otherwise guest access with limited features is available. An interactive map which can be used for ordering purposes contains some GIS data (place names, water bodies, glacial terrain) for BC.

2. GEO-DATA Explorer (GEODE).

<http://geode.usgs.gov>

Java-based interactive set of Geological Survey GIS projects, some of which border British Columbia or include Canadian content. GEODE will detect your computer's settings in order to determine if it is able to access the site.

3. National Mapping Information.

<http://mapping.usgs.gov/>

Featured on this site is interactive access to the *National Atlas of the United States*, the Geographic Names Information System, and digital cartographic products, including aerial photographs. The USGS is responsible for the US National Spatial Data Infrastructure which includes the Geospatial Data Clearinghouse and satellite imagery (remote sensing). The EarthShots (<http://www.usgs.gov/Earthshots/>) satellite imagery archives documents environmental change through remote sensing images and maps; little Canadian content as of 1 January 2001. All USGS products can be searched online through a variety of catalogues and indexing tools.

United States. Library of Congress.

1. Map Collections, 1544-1999.

<http://memory.loc.gov/ammem/gmdhtml/gmdhome.html>

Part of the American Memory digital library, maps can be searched by keyword, subject matter, or browsed by place. Several examples from British Columbia, Alaska and the Pacific coast are available. The high-resolution digital maps can be zoomed in.

2. Meeting of Frontiers.

<http://frontiers.loc.gov/intldl/mtfhtml/mfhome.html>

This bilingual (English and Russian) digital collection includes a selection of maps documenting the Russian and American presence in Alaska.

3. Panoramic Maps, 1847-1929.

<http://memory.loc.gov/ammem/pmhtml/panhome.html>

Another American Memory digital library entry representing holdings of the Library of Congress. Four high-resolution panoramic maps of Victoria between 1860 and 1889 are available.

4. Railroad Maps, 1828-1900.
<http://memory.loc.gov/ammem/gmdhtml/rrhtml/rrhome.html>
Another American Memory contribution from the Library of Congress, many of these high-resolution digital maps include portions of BC served by various railroads.
5. Spain, the United States, & the American Frontier: Historias Paralelas.
<http://international.loc.gov/intldl/eshtml/eshome.html>
A bilingual, multimedia digital collaboration between the Library of Congress, the Institución Colombina and the National Library of Spain to document the parallel histories of both countries in North America. One or two maps pertain to the Spanish exploration of the northwest coast of North America.

United States. National Aeronautic and Space Administration. Visualization of Remote Sensing Data.

<http://rsd.gsfc.nasa.gov/rsd/>

Contains images, Web movies and 3D/virtual reality versions of remote sensing data, as well as an excellent set of links to remote sensing data and information. The main NASA Web site (<http://www.nasa.gov/>), along with those of the US National Oceanic and Atmospheric Administration, Environment Canada and Natural Resources Canada, are the best sites for remote sensing data and weather imagery.

United States. National Imagery and Mapping Agency.

<http://www.nima.mil/>

Provides access to unclassified global remote sensing and aerial imagery acquired by military satellites and other assets. Free NIMA digital data can be searched and downloaded from its Web-based Geospatial Engine. Searches are by a clickable map interface, by place name or by geographic coordinates.

United States. National Oceanic and Atmospheric Administration.

<http://www.noaa.gov/>

1. History of the NOAA
<http://www.history.noaa.gov/>
Contains links to nearly all the historic images and documents pertaining to hydrographic, land and aerial survey work pursued by the NOAA ever since President Thomas Jefferson established the Survey of the Coast in 1807.
2. National Geodetic Survey.
<http://www.ngs.noaa.gov/>
This office is responsible for land surveys and aerial photographs. Many of its products are also accessible through the NOS Mapfinder.
3. National Ocean Service. NOS Mapfinder.
<http://mapfinder.nos.noaa.gov/>
Site contains a Web-based locator of nautical chart, map (historical and modern) and coastal aerial photography for areas covered by the NOS.
4. Office of Coast Survey.
<http://chartmaker.ncd.noaa.gov/csdl/map-coll.htm>
An office within the National Ocean Service, its historical collection of high-

resolution nautical charts and maps can also be accessed through the NOS Mapfinder. Includes charts from Captain George Vancouver's voyages and hydrographic surveys of the waters between Washington and BC which can be viewed online or downloaded.

5. Photo Library.

<http://www.photolib.noaa.gov/index.html>

Includes high-resolution historic and modern images (art and photographs) documenting hydrographic and land surveys which can be browsed through online albums or keyword searched. Among the historic images found in a series of online albums titled *Treasures of the Library* (<http://www.photolib.noaa.gov/library/>) are colour images from Captain James Cook and Captain George Vancouver's voyages. *The Coast & Geodetic Survey Historic Image Collection* (<http://www.photolib.noaa.gov/historic/c&gs/index.html>) contains artwork and photographs documenting the history of this operation.

University of Arizona. Library. Map Collection. *Maps of the Pimería: Early Cartography of the Southwest.*

<http://dizzy.library.arizona.edu/pimeria/>

Virtual exhibit of cartography of the Spanish Southwest between the 16th and 19th centuries; includes several maps depicting North America. Maps are high-resolution, but the quality varies.

University of British Columbia Libraries.

1. Map Library.

<http://www.library.ubc.ca/map/>

Open to the general public, with an international collection in a variety of cartographic formats, the Map Library's catalogue is integrated into the online UBC Library Catalogue. The *Browser's Guide to Cartographic Materials Held in the UBC Map Library* provides tabular access by country to the classification systems used by the library. A tutorial on GIS is available, along with a set of links.

2. Special Collections and University Archives Division. Cartographic Archives and Historical Maps

<http://www.library.ubc.ca/spcoll/>

Finding aids to a few map and architectural collections are available, along with sample images. The annotated *A Bibliography of Sources in the University of British Columbia Library* by Frances M. Woodward is extremely useful. All historical maps are described in the online UBC Library Catalog.

University of California, Berkeley. Library. Digital Map Collection.

<http://library.berkeley.edu/EART/browse.html>

Browsable selection of several hundred digitized maps. Non-California maps can be viewed through a hyperlink to the library's Web-based catalogue. Many of the maps are pre-20th century.

University of Georgia Libraries. Rare Map Collection at the Hargrett Library.

<http://scarlett.libs.uga.edu/darchive/hargrett/maps/maps.html>

Thematic collection of digitized maps in the JPEG image format, chiefly centred on the Southern United States, but including North American colonial and western North American.

University of Minnesota. James Ford Bell Library.

<http://bell.lib.umn.edu/>

Several online versions of early maps depicting the North American continent.

University of Texas at Austin Libraries. Perry-Castañeda Library. Map Collection.

http://www.lib.utexas.edu/Libs/PCL/Map_collection/Map_collection.html

In addition to categorized links to Web-accessible maps, the library also maintains an Electronic Map Collection containing both downloadable files of digitized maps and links to maps, including historical maps, on other Web sites. Among the downloadable historical maps of BC are an 1859 Fraser River gold rush map published in Germany; an 1895 Rand, McNally atlas page; and a 1917 automobile map illustrating two routes from Vancouver to Mission.

University of Toronto, Department of Geography. *Historical Atlas of Canada Online Learning Project*.

<http://mercator.geog.utoronto.ca/hacddp/>

Re-presentation of selected information from the three-volume atlas for interactive, curriculum-based study. Much of this project, especially information specific to BC, is under development.

University of Victoria. Department of Geography. Map Library.

<http://office.geog.uvic.ca/dept/facilities/maplib.html>

A brief summary of the Map Library's holdings.

Vicinity Corporation. MapBlast!

<http://www.mapblast.com/>

One of two competing products in this listing, the other being MapQuest, that provides driving directions and address lookup displayed on a zoomable map. The accuracy of the address location is less than perfect. Maps can be downloaded to wireless devices such as web-enabled phones (WAP) or portable data assistants (PDA) which use the Palm or Windows CE operating systems. A unique feature of MapBlast! is its GeoSearch facility that can keyword search for Web sites within a one to 100 mile radius of any North American address.

Yale University. Library. The Map Collection.

<http://www.library.yale.edu/MapColl/index.htm>

An important university collection of maps, the site features direct links to online rare maps, globes, atlases and virtual exhibits featuring maps from its collection.

CORdLink: A Window on Cordilleran Geology

<http://cordlink.gsc.nrcan.gc.ca>

A joint project of the Geological Survey of Canada, Pacific Division; BC Geological Survey; and UBC Department of Earth and Ocean Sciences, this multimedia collection and research/educational tool documents the geology of the Canadian Cordillera in BC and Alberta. Includes maps, documents (publications), and images (photographs). Geological datasets from the GSC and the BCGSC are available through a map interface. The Autodesk MapGuide Web browser plug-in is required to view the interactive maps.

SOFTWARE

Many of these software sites include GIS tutorials and links to other Web sites. Registration with an e-mail address or other personal information is often required before software can be downloaded.

Adobe Systems Incorporated. Adobe Acrobat Reader.

<http://www.adobe.com/>

Free viewer for reading files ending with the file name extension PDF (Portable Document Format). Use the Products index or the link on the main page to download the software.

Autodesk, Inc.

<http://www.autodesk.com/>

Use the Product Center section to locate the following software.

1. Autodesk MapGuide.

Web browser plug-in for viewing and interacting with GIS maps.

2. WHIP! Viewer.

Web browser plug-in for viewing drawings produced with the AutoCAD software.

Environmental Systems Research Institute, Inc. (ESRI). ArcExplorer.

<http://www.esri.com/software/arcexplorer/index.html>

A free standalone or Internet-capable GIS data viewer available in Windows and Java versions.

Geographic Systems & Analysis cc. CartoMAP.

<http://www.cartoworld.com/>

Free map viewer that supports various imported GIS file formats.

Intergraph Corporation. GeoMedia Viewer.

<http://www.intergraph.com/gis/demos/viewer/>

Free GIS creation and data viewer. The free sample data only covers the United States.

Map Maker Ltd. Map Maker Basic.

<http://www.mapmaker.com/>

Limited-features version of Map Maker Pro from this Scottish company. Its Web site includes extensive information on producing GIS maps. Look for the link to Map Maker Basic 3 which is only available for the Windows platform.

MapInfo Corporation. MapInfo ProViewer.

<http://testdrive.mapinfo.com/proviewer>

Used for viewing GIS maps made with MapInfo Pro.

Softree Technical Systems Inc. Terrain Tools Freeware Edition.

<http://www.softree.com/betatest/TTOOLS.HTM>

Software for survey and mapping from a British Columbia company.