GeoTools
for Mapping and Spatial Analysis

Make your own maps and start performing powerful spatial analysis of the Earth's climate, population, biodiversity, landforms, river systems, natural hazards, land use, agriculture, geology, and more, using online geotechnologies—Geographic Information Systems (GIS), Global Positioning Systems (GPS), and Remote Sensing.

Table of Contents

Mapping People at Places: Population and Development Analysis

Studying the spatial and temporal characteristics and migration of people is fundamental to geography, sociology, and other subjects, and is easier than ever to do with these web-GIS tools.

1. American Fact Finder's Thematic Maps: http://factfinder.census.gov
2. Labor Employment Dynamics: http://lehd.dsd.census.gov/led/datatools/onthemap.html
3. CensusScope: http://censusscope.org
4. SocialExplorer: http://socialexplorer.com
5. CensusTrax: http://censustrax.com
6. CIESEN's Demog Data Viewer: http://plue.sedac.ciesin.columbia.edu/plue/ddviewer/
7. Modern Language Association's Language Map: http://www.mla.org/census_map
8. CommonCensus Project: http://www.commoncensus.org/
9. Cartograms on hundreds of variables: http://www.worldmapper.org
10. Gapminder: Graphs and map-based analysis of human development indices worldwide: http://www.gapminder.org
11. Nationmaster's data and rankings on world countries: http://www.nationmaster.com
12. Statemaster's data and rankings on US states: http://www.statemaster.com

Virtual Globes: Explore the Planet in 3-D

Our planet is a 3-dimensional planet, so exploring it in a computerized 3-D environment is intuitive and engaging. Start your journey by streaming 3-D data with the following tools.

13. ESRI's ArcGIS Explorer: http://www.esri.com/arcgisexplorer
14. NASA's Worldwind: http://worldwind.arc.nasa.gov
15. Google Earth: http://earth.google.com
16. SkylineSoft's TerraExplorer: http://www.skylinesoft.com
17. SkylineGlobe: http://www.skylineglobe.com

Mapping Your Own Places: Geocoding and Beyond

Geocoding is the process of locating your own data on a map, aerial photograph, or satellite image, and can be easily done with the following tools.

18. GPS Visualizer: http://gpsvisualizer.com
19. Batch Geocoding: http://www.batchgeocode.com
20. Wayfaring: http://www.wayfaring.com/
21. Zee Maps: http://www.zeemaps.com
22. Your G Map: http://yourgmap.com
23. Platial: http://www.platial.com
24. Fresh Logic Atlas: http://atlas.freshlogicstudios.com/
25. The Student Data Mapper: http://kangis.org/mapping/sdm/
26. Convert USA street addresses to latitude-longitude: : http://geoinfo.sdsu.edu/hightech/Address_ed/
27. ArcIMS User Sites Registry: http://www.esri.com/software/internetmaps/index.html
28. ArcWeb Services for Students and Educators; a set of free global mapping scripts for web-based GIS development: http://www.esri.com/software/arcwebservices/students-educators.html
29. ArcWeb Explorer. Make satellite, street, and demographic maps, geocode, upload your own data, create routes, and much more: http://arcwebservices.com/awx

Real-Time Mapping

The ability to map and analyze phenomena that is currently occurring or that happened minutes or hours ago is a powerful teaching tool.

30. USA Wildfires: http://www.geomac.gov
31. Earthquakes: http://earthquakes.usgs.gov/eqcenter/
32. Streamflow and water quality: http://waterdata.usgs.gov/nwis/rt
33. NASA Weather Satellite Imagery: http://www.ghcc.msfc.nasa.gov/GOES/

Geocoded Ground Photographs

The ground photographs are keyed to latitude-longitude locations, and therefore allow for a study of biomes, human impact on the landscape, and even allow you to tag your own photographs from field trips to online maps.

34. American Mile Markers: http://www.kodak.com/US/en/corp/features/onTheRoad/
35. Degree Confluence Project: http://www.confluence.org
36. Flickr: http://www.flickr.com/map/

Historical Maps

The web's archive of high-quality, zoomable historical maps is growing daily. Some even contain georeferencing information to enable them to be easily brought into a desktop GIS for further analysis.

37. Rand McNally Classroom. Includes hundreds of historical maps as well as the Goode's World Atlas! http://randmcnallyclassroom.com/
38. Historical topographic Maps from Maine to Ohio: http://historical.maptech.com
39. David Rumsey—one of the best collections of historical maps on the planet: http://www.davidrumsey.com
40. Map Collections at the Library of Congress: http://memory.loc.gov/ammem/gmdhtml/
41. Perry-Castaneda Library Historical Map Collection: http://www.lib.utexas.edu/maps/
42. The UK's most extensive collection of historical maps: http://www.old-maps.co.uk/

Have Web Browser, Will Map: National and International GIS on the Web

These sites have progressed far beyond web mapping tools to some powerful visualization and analysis. With nothing but your Web browser, you can explore numerous sites with ready-made maps. Other sites allow you to build and investigate your own maps using menus of choices and selected mapping tools. Still others contain GIS-ready data sets that you can use with GIS software such as ArcView and ArcExplorer Java Edition for Education (http://www.esri.com/aejee). Some require a current version of Firefox, Mozilla, Navigator, or Microsoft Internet Explorer installed, and a broadband Internet connection.

The following sites offer online mapping opportunities and others that focus on data access. Many sites offer downloadable static maps, aerial photographs, and satellite images.

43. A good place to get an overview on GIS, its uses, and other information is at GIS.com: http://www.gis.com.

44. Forthcoming! ArcGIS Explorer (http://www.esri.com/arcgisexplorer); new free 3D exploration and analysis tool from ESRI.

45. ArcIMS User Sites Registry (http://www.esri.com/software/internetmaps/index.html) includes some focused explorations from global to some local levels.

46. ArcWeb Services for Students and Educators: http://www.esri.com/software/arcwebservices/students-educators.html ; a set of free global mapping APIs for Web-based GIS development.

47. Geography Network (http://www.geograpynetwork.com) is the global cooperative for publishing and sharing geographic data and map services over the Internet. See also the new multi-source mapping function, ArcExplorer Web Edition.

48. Learn about the capability of the Geography Network and how to make maps at http://www.geographynetwork.com/maps/arcexplorerweb.html.

49. The Federal Government's Geospatial One-Stop: http://www.geo-one-stop.gov allows access to many maps and services.

50. The Federal Government's Geodata.gov www.geodata.gov is another web-based portal for one-stop access to US maps, data and other geospatial services.

51. National Geographic's Map Machine (www.nationalgeographic.com/maps) is a joint

effort between the Society and ESRI that allows for creating regional and local maps on over 40 variables: weather, biomes, population, imagery, and more.

52. NOAA Office of Coast Survey—Electronic Navigation Charts include an online mapping site (http://ocs-spatial.ncd.noaa.gov/encdirect/viewer.htm) as well as other chart information including historical charts: http://chartmaker.ncd.noaa.gov/

53. Rural Policy Research Institute (http://circ.rupri.org) "interactive Mapping" Map Room provides much explorable U.S. (48 states) data at variable scales.

54. US EPA's "Surf Your Watershed" map server (www.epa.gov/surf) permits exploring according to physical region, rather than political region.

55. EPA's EnviroMapper: http://maps.epa.gov/enviromapper/
56. Reproductive Health Atlas: http://www.cdc.gov/reproductivehealth/gisatlas/index.htm
57. UC Atlas of Global Inequality: http://ucatlas.ucsc.edu/
58. UN Maps and Graphics: http://maps.grida.no/, http://www.povertymap.net/
59. Flood Maps (global sea level rises): http://flood.firetree.net/
60. GESource World Guide: http://www.gesource.ac.uk/worldguide/
61. Geography Network: http://www.geographynetwork.com
62. National Geographic's Map Machine: http://www.nationalgeographic.com/maps/
63. NOAA Electronic Navigation Charts online mapping: http://ocs-spatial.ncd.noaa.gov/encdirect/viewer.htm and historical charts: http://chartmaker.ncd.noaa.gov/
64. Rural Policy Research Institute: http://circ.rupri.org/
65. US EPA's "Surf Your Watershed" map server: http://www.epa.gov/surf
66. This Dynamic Planet. Explore impact craters, plate boundaries, volcanoes, earthquakes, and much more: http://www.minerals.si.edu/tdpmap/index.htm
67. Geogreeting—greeting "cards" with letters that use building shapes from satellite imagery: http://www.geogreeting.com

Using ArcIMS Data Servers

Use these sites within ESRI desktop software (ArcExplorer Java Edition for Education (AEJEE) or ArcGIS) to stream a wealth of Internet content to your desktop and integrate it with your GIS applications! Some addresses may need slight adjustments for use in GIS software.

Search

68. Google (http://www.google.com) (type "arcims" plus the topic and/or region of interest)
69. Kansas Geol. Survey's MAPDEX http://www.mapdex.org/

ESRI

70. Geography Network: (http://www.geographynetwork.com/)
    (AEJEE: http://www.geographynetwork.com)
71. 2005 Hurricanes from ESRI Canada:
    http://www.geographynetwork.ca/website/hurricanes
    (AEJEE: http://www.geographynetwork.ca)
72. ESRI Data Download: http://www.esri.com/data/download/basemap/index.html
73. ArcGIS Online: http://arcgisonline.esri.com/

Federal

74. Geodata.gov: http://www.geodata.gov
75. USGS National Map http://nmviewogc.cr.usgs.gov/
    (AEJEE: http://nmviewogc.cr.usgs.gov [nhdgeo])

76. USGS GeoMAC http://geomac.gov (AEJEE: http://geomac.gov) for wildfire mapping.
77. USGS Seamless (AEJEE: http://seamless.usgs.gov)
78. USGS Mineral Resources (AEJEE: http://mrdata.usgs.gov)
79. USGS Planetary GIS (PIGWAD)
    http://webgis.wr.usgs.gov/pigwad.htm
    (AEJEE: http://webgis.wr.usgs.gov)
80. NOAA NOWCOAST (AEJEE: http://nowcoast.noaa.gov)
81. NOAA NOSA NGDC http://map.ngdc.noaa.gov/website/nosa/
    (AEJEE: http://map.ngdc.noaa.gov; don't do NOSA)
82. NOAA ENC Chart
    http://ocs-spatial.ncd.noaa.gov/website/encdirect/default.htm
    (AEJEE: http://ocs-spatial.ncd.noaa.gov)
83. NOAA Coral Reef Info System http://www.coris.noaa.gov/
    (AEJEE: http://www.coris.noaa.gov)
84. EPA (AEJEE: http://geodata.epa.gov)
85. Regional Bird Conservation Tool
    (http://umesc-ims01.er.usgs.gov/website/new_bird/viewer.htm)
    (AEJEE: http://umesc-ims01.er.usgs.gov)
86. Forest Service (http://maps.fs.fed.us) (AEJEE: http://maps.fs.fed.us)

Regional

87. UNEP World Conservation Monitoring Centre
    http://www.unep-wcmc.org/press/Earthdive/index.htm
    (AEJEE: http://bure.unep-wcmc.org)
88. San Antonio College GIS for Humanities (awesome!)
    (AEJEE: http://sacarcims.sac.accd.edu)
89. KanGIS Student Data Mapper (http://kangis.org/mapping/sdm)
90. Pennsylvania Spatial Data Access: PASDA (http://www.pasda.psu.edu)
    (AEJEE: http://maps.pasda.psu.edu [Latest Radar, Latest Infrared] or
    http://gis1.pasda.psu.edu [National Temp Forecast])
91. Towson University's Chesapeake: (http://chesapeake.towson.edu/mapping)
    (AEJEE: http://mafsmap.towson.edu)
92. Minnesota Twin Cities (http://www.datafinder.org)
93. IMAP Hawaii (http://gis.state.hi.us/website/OPGeneral) (AEJEE: http://gis.state.hi.us)
94. Bahamas Online Digital Map Atlas (http://crem.rsmas.miami.edu/GIS/Bahamas)
    (AEJEE: http://crem.rsmas.miami.edu)
95. Pacific Disaster Center (AEJEE: http://www.pdc.org)

Geographic Information Systems (GIS) in Education

Discover videos, content standards, lessons, and other ways to support the implementation of GIS throughout primary, secondary, technical, and university education and also in informal education.

96. GIS.com resources: http://www.gis.com
97. GIS Day videos, guidelines, applications: http://www.gisday.com
98. ESRI Primary and Secondary Education: http://www.esri.com/schools
99. ESRI College and University: http://www.esri.com/highered
100. ESRI Libraries and Museums: http://www.esri.com/libraries/
101. ESRI ArcLessons—library of over 200 GIS-based lessons:
    http://www.esri.com/arclessons
102. GIS in Education: http://education.usgs.gov/common/lessons/gis.html
103. Mapping Our World book from ESRI Press: http://www.esri.com/mappingourworld
104. TERC's Educational GIS listserv: https://list.terc.edu/mailman/listinfo/edgis

105. The National Council for Geographic Education supports a GIS Special Interest Network: http://www.ncge.org

GIS Data Sets

Got data? Hundreds of online sites provide data for free download to use with GIS software.

106. ESRI data sets (www.esri.com/data) include a number of free data resources as well those available for a fee. CommunityInfo for Educators is a compilation of over 1,000 variables primarily from the 2000 census for states, metro areas, counties, ZIP code areas, census tracts, and block groups.

107. Geography Network (www.geographynetwork.com) sites offer downloadable GIS-ready data.

108. Geography Network's Census 2000: www.esri.com/data/download/census2000_tigerline/index.html site contains layers of free downloadable geography and some population/housing data from the 2000 census.

109. Guide to US Geospatial Data http://libinfo.uark.edu/GIS/us.asp service from the University of Arkansas Libraries.

110. Mapdex www.mapdex.org/search/ is a global network of GIS and RS data servers.

111. UN Environment Programme World Data Portal**:** http://geodata.grid.unep.ch/

112. The National Atlas (www.nationalatlas.gov) contains over 200 themes of data at many scales for the U.S. Data for free download—from Agriculture to Zebra Mussels!

113. The National Map (www.nationalmap.gov) contains dozens of layers, from digital elevation data to topographic maps that can be downloaded for user-defined areas.

114. The National Hydrography Dataset: http://nhd.usgs.gov
Mapping Viewer: http://nhdgeo.usgs.gov/viewer.htm
and FTP site: ftp://nhdftp.usgs.gov/SubRegions/

115. USGS's Global GIS Data (http://webgis.wr.usgs.gov/globalgis/) contains descriptions of a seven-CD or single DVD data series for use with ArcView. 1:1 million scale physical and human geographic data. Order information and educational pricing from the American Geological Institute (www.agiweb.org/pubs/globalgis). Sample lessons built from the Global GIS data on http://education.usgs.gov/common/gis.html

116. The Federal Government's Geospatial One-Stop:
http://gos2.geodata.gov/wps/portal/gos

117. GIS Data Depot: http://www.gisdatadepot.com

118. WebGIS: http://www.webgis.com

119. USGS EROS Data Center GeoData Portal: http://eros.usgs.gov/geodata/

120. USDA Lighthouse Gateway:
http://datagateway.nrcs.usda.gov/GatewayHome.html

Federal Agencies: From static images to interactive networks

Many U.S. federal agency Web sites incorporate map, aerial, radar, and satellite images as static complements to their offerings. While unchangeable, these can be useful additions to geographic explorations. Others embrace a host of geographic possibilities. Some locations to visit include:

EPA

121. BASINS—watershed information: http://www.epa.gov/ostwater/basins
122. Environmental Education Portal www.epa.gov/enviroed/

Library of Congress/Historical Maps

123. Map Collections: http://lcweb2.loc.gov/ammem/gmdhtml/gmdhome.html
124. Perry-Castaneda Map Library: http://www.lib.utexas.edu/Libs/PCL/Map_collection/Map_collection.html
125. David Rumsey Map Collection: http://www.davidrumsey.com

NASA

126. Destination Earth: www.earth.nasa.gov/flash_top.html
127. Digital Earth: www.digitalearth.gov
128. Global Change Master Directory: http://gcmd.nasa.gov/
129. JPL Earth Sciences Home Page: www.jpl.nasa.gov/earth
130. NASA Multimedia: www.nasa.gov/multimedia/highlights/
131. NASA Shuttle Photo Gallery: http://eol.jsc.nasa.gov/sseop/clickmap/
132. Scientific Visualization Studio: http://svs.gsfc.nasa.gov/
133. Shuttle Radar Topography Mission: www.jpl.nasa.gov/srtm
134. SIR-C Mission Home Page: http://southport.jpl.nasa.gov/sir-c
135. Visualization of Remote Sensing Data: http://rsd.gsfc.nasa.gov/rsd

NOAA

136. Geostationary Satellite Server: www.goes.noaa.gov/
137. Interactive Weather Information Network: http://iwin.nws.noaa.gov/iwin/graphicsversion/bigmain.html
138. Laboratory for Satellite Altimetry (oceanographic): http://ibis.grdl.noaa.gov/SAT/SAT.html
139. National Ocean Service: http://mapfinder.nos.noaa.gov
140. Operational Significant Event Imagery Server: www.osei.noaa.gov
141. Satellite's Eye Art Gallery: www.ncdc.noaa.gov/ol/satellite/satelliteseye/satelliteseye.html
142. Space Physics Interactive Data Resource, including Nighttime Lights of the World: http://spidr.ngdc.noaa.gov/

USDA

143. Census of Agriculture from 1992, 1997, and 2002: www.nass.usda.gov/Census_of_Agriculture/index.asp
144. Agriculture Census Atlas from 2002: www.nass.usda.gov/research/atlas02/
145. US Forest Service, Data and Information Systems: www.fs.fed.us/database
146. US Forest Service, Forest Land Maps: www.fs.fed.us/links/maps.shtml
147. NASS Crop Maps: www.usda.gov/nass/aggraphs/cropmap.htm
148. National Agricultural Statistics Service Main Page: www.nass.usda.gov
149. Natural Resources Conservation Service Main Page: www.nrcs.usda.gov
150. NRCS Technical Resources: www.nrcs.usda.gov/TechRes.html

USGS

Geography

151. Geography/Mapping Main Page http://mapping.usgs.gov
152. Educational Outreach: http://education.usgs.gov

Biology

153. Biological Resources Division's Main Page: http://biology.usgs.gov/

154. North American Breeding Bird Survey:
http://www.mbr-pwrc.usgs.gov/bbs/bbs.html
155. Bird Species Map Page:
http://www.mbr-pwrc.usgs.gov/bbs/htm96/map617/all.html

Geology

156. Geologic Division's Main Page: http://geology.usgs.gov/index.shtml
157. National Earthquake Information Center:
http://earthquake.usgs.gov/eqcenter/
158. Earthquake Search and Data Download:
http://neic.usgs.gov/neis/epic/epic.html
159. Earthquake Feeds and Data, including recent earthquakes:
http://earthquake.usgs.gov/eqcenter/catalogs/
160. Earthquakes in the Past 7 Days:
http://earthquake.usgs.gov/eqcenter/catalogs/eqs7day-M1.txt

Water Resources

161. Water Resources Division's Main Page: http://water.usgs.gov
162. National Water Conditions Home Page: http://water.usgs.gov/nwc
163. Hydrosheds: http://hydrosheds.cr.usgs.gov/

X Marks the Spot: Global Positioning Systems (GPS)

Starting Points

164. GPS World Online: http://www.gpsworld.com
165. Joe Mehaffey and Jack Yeazel's GPS Website http://joe.mehaffey.com/
166. Peter Bennett's GPS Site http://vancouver-webpages.com/peter/
167. Sam Wormley's GPS Resources http://www.edu-observatory.org/gps/gps.html
168. GPS Information.net Resources: http://www.gpsinformation.net/

Educational Applications of GPS

169. The ESRI Press book *Fun With GPS* contains wonderful ideas for using GPS in educational and recreational settings, information about base map data, and much more:
http://gis.esri.com/esripress/display/index.cfm?fuseaction=display&websiteID=91&moduleID=0
and its companion web site: http://www.funwithgps.com/

170. Guidelines on how to plan a field experience and enhancing that experience with GPS and GIS are available via "From Field Trips to Hotlinks" on the ESRI ArcLessons site: http://gis2.esri.com/industries/education/arclessons/search_results.cfm?id=12

171. GPS to GIS: A More Perfect Union, guidelines on:
http://gis2.esri.com/industries/education/arclessons/search_results.cfm?id=302

172. Lesson that covers the creation and use of tables in a GIS environment:
http://gis2.esri.com/industries/education/arclessons/search_results.cfm?id=239

173. ESRI ArcLesson that covers "GIS+GPS=MAPS":
http://gis2.esri.com/industries/education/arclessons/search_results.cfm?id=241

174. GPS download lesson as part of a larger 4H geography lesson:
http://www.sccyd4h.org/Mapping/index.htm

175. Anton Ninno's GPS and GIS Education Forum:
http://groups.yahoo.com/group/nygps/

176. GPS in Education: http://education.usgs.gov/common/lessons/gps.html
177. Geocaching: http://www.geocaching.com
178. Earthcaching: http://www.earthcache.org
179. Wayfinding: http://www.wayfinding.org
180. Drawing Shapes with GPS: http://www.gpsdrawing.com
181. GIS to GPS Support, Training, and Resources: http://www.gis2gps.com

Mapping Your GPS Coordinates

A plethora or freeware, shareware, web-based, desktop-based, and for-purchase programs are available for you to map and analyze your GPS-tagged field data.

[A] Mapping Your Coordinates with Web-Based GIS

182. ArcWeb Explorer: http://www.arcwebservices.com/awx
183. ArcGIS Explorer: http://www.esri.com/software/arcgis/explorer/index.html.
184. GPS Visualizer: http://www.gpsvisualizer.com
185. Topozone (http://www.topozone.com) displays coordinates in several different formats when you when you select a specific point on a topographic map.
186. Mapping Tools such as MapQuest (http://www.mapquest.com) can be used, but may require you to enter your coordinates in a string, such as: http://www.mapquest.com/maps/map.adp?latlongtype=decimal&latitude=40.18&longitude=-105.47.

[B] Freeware Programs

187. Waypoint, from tapr.org: http://www.tapr.org/~kh2z/Waypoint/OverviewInfoContents.htm
188. GPS Connect for Garmin, for the Macintosh: http://www.chimoosoft.com/products/gpsconnect/
189. USA PhotoMaps from JDMCox: http://www.jdmcox.com with guidelines from Frank Wideman: http://extension.missouri.edu/perry/GPSGIS.shtml
190. G7 To Win and G7 to CE: http://www.gpsinformation.org/ronh/
191. Minnesota Department of Natural Resources (DNR) Garmin: http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html
192. Topografix's EasyGPS http://www.easygps.com/

[C] For-purchase or shareware programs.

193. Geospatial Expert's GPS-Photo Link http://www.geospatialexperts.com/productstd.html
194. National Geographic Topo GPS USA: http://maps.nationalgeographic.com/TOPO/gps.cfm
195. GPS Utility, from the UK: http://www.gpsu.co.uk
196. Andren Software's Loran GPS Program: http://www.andren.com/
197. Everytrail's program to upload GPS coordinates and photographs onto the web: http://www.everytrail.com/upload.php
198. Robogeo: http://www.robogeo.com/home/
199. Mac (Macintosh) GPS Pro: http://www.macgpspro.com/
200. Expert GPS: http://www.expertgps.com/
201. TopoFusion: http://www.topofusion.com
202. Fugawi: http://www.fugawi.com/web/

[D] Programs made by GPS manufacturers, which sometimes come with the GPS units.

203. Garmin MapSource: http://www.garmin.com/cartography/mapSource/tripandwaypoint.jsp

204. Trimble Pathfinder: http://www.trimble.com/pathfinderoffice.shtml

[E] Utilities included with recreational mapping software.

205. National Geographic TOPO! http://maps.nationalgeographic.com/TOPO/
206. DeLorme Street Atlas and Topo Map Products: http://www.delorme.com
207. MapTech's Terrain Navigator Pro: http://www.maptech.com
208. Memory Map: http://www.maptown.com/memorymap.html
209. OziExplorer: http://www.oziexplorer.com/

[F] GPS tools inside GIS software.

210. GPS Toolbar for ArcGIS. Access via View→ Toolbars. This is most useful if you are streaming GPS coordinates to your computer in real-time; that is, you have your computer in the field with you.

211. GPSi (GPS interface) tool for Garmin GPS. Download from: http://arcscripts.esri.com/details.asp?dbid=12749

    GPSi is an ArcMap Toolbar that allows users to communicate with Garmin handheld GPS units. It was developed to allow users to rapidly download/upload data directly from ArcMap.

Federal Agencies

212. Federal Aviation Administration: Satellite Navigation Product Teams http://gps.faa.gov/Links/links-gov-text.htm
213. Stennis Space Center's GPS Applications Exchange: http://gpshome.ssc.nasa.gov/
214. International GNSS Service: http://igscb.jpl.nasa.gov/
215. National Geodetic Survey's GPS Orbits: http://www.ngs.noaa.gov/GPS/GPS.html
216. National Space-Based Positioning, Navigation and Timing Executive Committee: http://pnt.gov/
217. US Coast Guard Navigation Center: http://www.navcen.uscg.gov/
218. US Naval Observatory GPS Operations: http://tycho.usno.navy.mil/gps.html

Private companies

219. Applied Field Data Systems – GPS and field data collection tools: http://www.afds.net/
220. Eagle Electronics: http://www.eaglegps.com/
221. HL Dalis – GPS and other electronic equipment: http://www.hldalis.com
222. Garmin GPS: http://www.garmin.com
223. Garmin's "What is GPS?" http://www.garmin.com/aboutGPS/
224. Garmin's GPS guide: http://www.garmin.com/aboutGPS/manual.html
225. GPS Manufacturers and Service Providers: http://gauss.gge.unb.ca/manufact.htm
226. Leica Geosystems: http://www.leica-geosystems.com/
227. Lowrance http://www.lowrance.com
    Lowrance graphics on selective availability: http://www.lowrance.com/Tutorials/GPS/gps_tutorial_01.asp)
228. Magellan GPS: http://www.magellangps.com/
229. The Aerospace Corporation's GPS Primer: http://www.aero.org/education/primers/gps/

230. Trimble GPS: http://www.trimble.com
Trimble's "All about GPS": http://www.trimble.com/gps/index.htm

Map projections and Cartography

231. The Geographer's Craft Project: Map Projections, GPS, Geodetic Datums, and Coordinate Systems:
http://www.colorado.edu/geography/gcraft/notes/mapproj/mapproj_f.html
232. GIS Development's histories of GIS, GPS, cartography, and remote sensing:
http://www.gisdevelopment.net/history/links/index.htm
233. Map History and More: http://www.maphistory.info/
234. Rice University's Mathematics of Cartography:
http://math.rice.edu/~lanius/pres/map/
235. University of Wisconsin's History of Cartography Project:
http://www.geography.wisc.edu/histcart
236. National Geographic Society: Round Earth, Flat Maps map projections resource:
http://www.nationalgeographic.com/features/2000/exploration/projections/index.html

237. USGS information on map projections:
http://erg.usgs.gov/isb/pubs/MapProjections/projections.html
238. USGS Universal Transverse Mercator Projection information:
http://erg.usgs.gov/isb/pubs/factsheets/fs07701.html
239. USGS Exploring Maps, Secondary Level teaching kit:
http://interactive2.usgs.gov/learningweb/teachers/exploremaps.htm
240. USGS Educational Outreach: http://education.usgs.gov

Remote Sensing: The Next Best Thing To Being There

Images of the Earth taken from above give us pictures of what exists in different locations. Taken by aircraft and orbiting satellites, these photographs and other kinds of images provide information used for navigation, to evaluate the utility of land for particular purposes, to create maps that show topography or streets, and to detect changes in the physical and natural environment. This area of spatial investigation is called remote sensing.

241. *"Remote sensing is the science and art of obtaining information about a phenomenon without being in contact with it…detecting and measuring it with devices sensitive to electromagnetic energy such as: light (cameras and scanners), heat (thermal scanners), and radio waves (radar)."* Source: David Schneider, Michigan Technological University, http://www.geo.mtu.edu/rs/

242. To find images for your community or region, use your favorite Internet search engine, searching on area name (like "Dallas") and keywords (like "aerial photography"). Be sure also to investigate the Microsoft Terraserver archive of US Geological Survey topographic maps and aerial photographs at Terraserver-USA (http://terraserver-usa.com), along with use and download guidelines from the USGS (http://rockyweb.cr.usgs.gov/public/outreach/terraserver.html).

Background and Instruction

243. International Center for Remote Sensing Education: Remote Sensing Core Curriculum: http://www.r-s-c-c.org
244. NASA Goddard Space Flight Center—Global View of the Earth, Landsat-7 Teacher's Kit: http://landsat.gsfc.nasa.gov/education/teacherkit/
245. The NASA Remote Sensing Tutorial http://rst.gsfc.nasa.gov/
246. SPACESTARS—GIS, GPS, Remote Sensing Curricula:
http://digitalquest.com/spacestars/
247. The European Earth Observation Web Site for Secondary Schools :

http://www.eduspace.esa.int

248. University of Montana—Earth Observing System Education Project
http://www.eoscenter.com (Select “Remote Sensing” and “Links” > “Remote Sensing Curricula”)

Base Maps, Aerial Photographs, and Satellite Imagery

249. Terraserver Topo Maps and Aerials: http://terraserver-usa.com
250. TopoZone: http://www.topozone.com
251. MapQuest: http://www.mapquest.com
252. Google Maps: http://maps.google.com
253. Multimap: http://www.multimap.com
254. Global Land Cover Facility: http://glcf.umiacs.umd.edu/index.shtml
255. Microsoft’s Live Local: http://local.live.com – look at the oblique aerial photographs.
256. Yahoo Maps: http://maps.yahoo.com
257. NASA’s ZULU satellite imagery: https://zulu.ssc.nasa.gov/mrsid/
258. Flash Earth maps and imagery: http://www.flashearth.com
259. NASA’s Visible Earth: http://visibleearth.nasa.gov/
260. Geomorphology from Space: http://disc.gsfc.nasa.gov/geomorphology/
261. Geographic images and GIS data at the Geography Network:
http://www.geographynetwork.com
262. NASA Digital Earth: http://www.digitalearth.gov
263. NASA Goddard Space Flight Center
Remote Sensing Data and Information:
http://rsd.gsfc.nasa.gov/rsd/RemoteSensing.html
NASA Scientific Visualization Studio: http://svs.gsfc.nasa.gov/
Visualization of Remote Sensing Data: http://rsd.gsfc.nasa.gov/rsd
264. NASA Jet Propulsion Laboratory
ASTER Satellite Image Gallery: http://asterweb.jpl.nasa.gov/gallery.asp
Shuttle Radar Topography Mission: http://www.jpl.nasa.gov/srtm
SIR-C Mission Home Page http://southport.jpl.nasa.gov/sir-c
265. Terralook - imagery showing change over time: http://terralook.cr.usgs.gov
266. Earthshots – imagery showing change over time:
http://edcwww.cr.usgs.gov/earthshots/slow/tableofcontents
267. NOAA
Geostationary Satellite Server: http://www.goes.noaa.gov/
Interactive Weather Information Network :
http://iwin.nws.noaa.gov/iwin/graphicsversion/bigmain.html
Laboratory for Satellite Altimetry—Oceanographic:
http://ibis.grdl.noaa.gov/SAT/SAT.html
Operational Significant Event Imagery Server: http://www.osei.noaa.gov

Private Companies

268. DigitalGlobe: http://www.digitalglobe.com
269. Earth Observation Magazine: http://www.eomonline.com
270. ESRI – Environmental Systems Research Institute: http://www.esri.com
271. GeoEye (Orbimage + Space Imaging): http://www.geoeye.com/
272. Leica Geosystems: http://www.leica-geosystems.com/

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