Using Real Time Data Resource Guide

This guide contains links to a host of Internet sites that have real-time information that will enhance traditional classroom lessons. With these resources your students can use real-time data to investigate earth systems.

Best Practices and Tips

http://www.vims.edu/bridge/data2.html -- **Tips on Using Research Data in the Classroom**

http://www.marine.rutgers.edu/outreach/rtd/sea.htm -- Real-Time Data Resources from **Ocean Observing Systems**. Emphasizes those sites, datasets and visualizations that are potentially most engaging for K-12 Education.

http://bottle.marine.rutgers.edu/mailman/listinfo/rtd_educators -- Sign-up for this Real-Time Data **Discussion Group** through Rutgers University.

http://www.mbari.org/EARTH/RTD&EdLitReview.pdf -- Literature Review from Monterey Bay Aquarium's Research Institute's Education and Research: Testing Hypotheses (EARTH) website on the impact of the use of real-time or near-real-time scientific data on the learning/test scores of K-12 students.

Understanding Satellite Imagery

http://octopus.gma.org/surfing/space.html -- **Space Available: Learning from Satellites** provides information and classroom activities that use satellite imagery.

http://disc.gsfc.nasa.gov/oceancolor/locus/index.shtml -- **The Laboratory for Ocean Color Users (LOCUS)** is a collaborative site featuring the use of Giovanni, a Web-based data exploration and analysis tool. LOCUS is intended to support the research use of Ocean Color Giovanni, which has data from SeaWiFS and MODIS-Aqua. The site includes several educational modules covering ocean color and sea surface temperature, boundary currents, upwelling and primary productivity, inter-annual and seasonal variability, and the Southern Ocean.

http://oceancolor.gsfc.nasa.gov/SeaWiFS/TEACHERS/ -- **SeaWiFS Teachers Resources**

Projects

Classroom Projects

http://www.ciese.org/realtimeproj.html -- **The Center for Innovation in Engineering and Science Education** provides hands-on activities and real-time data investigations.

http://www.coolclassroom.org/teachers_guide/teachersguide.html -- **The COOL Classroom** is a series of Internet-based instructional modules that link middle and high school classrooms with active research investigations at the Rutgers Marine & Coastal Sciences (RMCS) COOLroom, a collaboration of oceanographers studying the coastal ocean off the coast of New Jersey. Here you will find information about how to use the COOL projects and printable teachers guides.

http://www.dataintheclassroom.org/ -- **Data in the Classroom** is an online resource for teachers interested in using real scientific data in their teaching. The NOAA Ocean Data Education (NODE) Project is developing curriculum for grades 5-8 designed to help teachers and students use real scientific data to explore dynamic Earth processes and understand the impact of environmental events on a regional global scale. If you would like to help test and evaluate this curriculum guide, please visit the new Data in the Classroom Web site to register online.

http://www.uwm.edu/~kahl/WebQuests -- **Weather WebQuests** allow students learn to concepts in statistics while comparing the accuracy of local weather forecasters.

http://www.uwm.edu/~kahl/Forecast -- The **Internet Weather Forecasting Activity** helps students prepare a weather forecast for a specific city each week.

http://www-k12.atmos.washington.edu/k12/ -- **Live From Earth and Mars**, based at the University of Washington in Seattle and sponsored by NASA, has developed educational materials based on real time and retrospective Atmospheric Sciences and Space Sciences data and information. These resources are provided to K-12 educational systems, museums and the public via the World Wide Web, with special emphasis being placed on making the resources suitable for use in science and mathematics instruction. Atmospheric Sciences resources to display and explore the unique meteorology of the Pacific Northwest and the Puget Sound region with live data are available in conjunction with LIVE data from the Mars Mission.

Collaborative Projects

http://science-edu.larc.nasa.gov/SCOOL/index.html-- **The CERES S'COOL (Students' Cloud Observations On-Line) Project** involves school children providing ground truth measurements to assist in the validation of the CERES instruments in climate related studies. The website enables you to compare the surface- and space-based observations to learn more about clouds and climate.

http://www.ciese.org/collabprojs.html -- **The Center for Innovation in Engineering and Science Education** sponsors and designs Internet-based interdisciplinary projects that reach teachers and students throughout the country.

http://www.worldwatermonitoringday.com -- Coordinated by the Water Environment Federation and the International Water Association, **World Water Monitoring Day** boosts awareness of water quality issues by getting community groups out to local watersheds between September 18 and October 18 each year to test the water quality in their area. Groups use a simple monitoring kit and then report their results online into a global database. The goal is to build public awareness and involvement to protect the world's water resources.

http://www.globe.gov/r -- **The Global Learning and Observations to Benefit the Environment (GLOBE) Program** links students, teachers, and researchers worldwide in an effort to study and understand our global environment.

http://whale.wheelock.edu/Welcome.html -- **WhaleNet** is a unique interdisciplinary, hands-on, collaborative project to foster excitement and learning about the natural world in schools across the nation and around the globe. Access to live satellite data on position of whales, curriculum material and an ask-a-scientist pages are all available through this web site.

http://www.fieldtripearth.org/ -- **Field Trip North** joins the North Carolina Zoo and a team of researchers on an interactive project to track and study elephants in northern Cameroon, Atlantic Sea Turtles, and other animals. Read daily journals, interact with scientists in the field and track the animals in real time.

http://www.wfu.edu/biology/albatross/ -- **The Albatross Project** allows kids from all over to join with scientists to track ocean-going albatrosses in Hawaii. They are using sensitive satellites in space, miniature transmitters on birds, and rapid email communications to investigate the travels of these animals on the open ocean.

The Magic Planet Student Gallery -- We encourage students who create new datasets to publish their work on our Magic Planet. Students or classes doing a near- or real-time data project are welcome to submit stories, photos, and other project-related work. NOTE: To make the interactions with the Magic Planet and its scientific stories connect with general public users, we recommend focusing on research that is locally relevant and/or tied to our HMSC partners. Please contact Nancee Hunter (nancee.hunter@oregonstate.edu) for more information.

Real-Time Data Resources

General Data

http://yaquina.satlantic.com -- **The Land/Ocean Biogeochemical Observatory (LOBO)** in Yaquina Bay collects hourly water quality data, including temperature, salinity, dissolved oxygen, and fluorescence. The dataset (collected since Nov 2007) is accessed through the LOBOviz link on the website and is presented in line-graph form. LOBO datasets from other locations, including the Columbia River, Nova Scotia, Maine, Florida and Monterey Bay, CA, are linked on the website and are presented in similar formats.

http://www.bigelow.org/virtual/ -- **Virtual Vacationland** provides web-based earth science data and information. Content is arranged by topic: land topography, bathymetry, coastal tides, ocean buoy data, ocean temperature, weather and climate, and watersheds and rivers. There are links to over forty "hands on" activities, as well. Each topic has background information, terminology, key questions, web links, and images & animations.

http://www.stccmop.org-- **The National Science Foundation Science and Technology Center for Coastal Margin Observation & Prediction** offers access to real-time data collected within the Columbia River Estuary, the Columbia River Plume, and a station near Newport, OR. The variables measured include: CDOM, Chlorophyll, nitrate, oxygen, salinity, temperature, tides, and turbidity. Due to the extreme conditions, some stations may not be functioning at a given time. Some time series date back to 1993. To find CMOP's data please go to http://www.stccmop.org/education/teacher and click on the Observation Stations Interactive Map. Activities to support the data will be available beginning in early summer.

Animal Data

http://seamap.env.duke.edu/ -- The website for project **OBIS-SEAMAP (Ocean Biogeographic Information System - Spatial Ecological Analysis of Megavertebrate Populations)** provides marine mammal, seabird and sea turtle data organized into a spatially referenced database. The site allows you to map species ranges and also features a wealth of species profiles. The data sets contain survey information dating back to 1935.

http://www.reef.org/data/data.htm -- **REEF Fish Survey Database** allows access to marine fish species distribution and abundance data for coastal U.S. waters or you can view data summaries for the Great American Fish Count.

http://www.seaturtle.org/tracking -- **Seaturtle.org** provides an easy to use tool for collecting, managing and sharing sea turtle satellite tracking data in near real time. You will find information for your class to "Adopt a Turtle", downloadable blank maps in PDF files for use in the classroom and turtle tracking data for registered users.

http://www.topp.org/ -- **Tagging of Pacific Predators (TOPP)** follows the adventures of leatherback turtles, white sharks, elephant seals, salmon sharks, albatross, and 18 other species.

Water and Oceanography Data

http://www.nodc.noaa.gov/dsdt/cwtg/ -- **National Oceanographic Data Center (NODC) Coastal Water Temperature Guide** gives you near real-time water temperature data and average monthly water temperature data from stations along the coastal U.S.

http://seaboard.ndbc.noaa.gov/ -- **National Data Buoy Center** gives you real-time data for wind direction, wind speed, wind gust, wave height, dominant wave period, atmospheric pressure, pressure tendency, air temperature, and water temperature for buoys around the world.

http://www.drifters.doe.gov/ -- **Project YOTO Drifters** uses data from ocean drifting buoys to integrate ocean science into your classroom science and math instruction, includes suggested educational activities and curriculum materials.

http://waterdata.usgs.gov/nwis/rt -- **Real-Time Water Data** from the United States Geological Survey includes streamflow data including flow, stage and temperature for stations around the country.

http://topex-www.jpl.nasa.gov/ -- The **TOPEX/Poseidon** project provides global sea level height data plus an education section with an online tutorial of altimetry.

http://tidesandcurrents.noaa.gov/ -- **NOAA's Water Level & Associated Data** provides historical and real-time water level data for stations throughout the United States, plus other oceanographic and meteorological data such as air and water temperature. For a basic overview on Tides and Water Levels, go to http://www.oceanservice.noaa.gov/education/kits/tides/welcome.html

http://www.nanoos.org – **The Northwest Association of Networked Ocean Observing Systems (NANOOS)** web portal provides near- and real-time ocean observation (surface currents, temperature, salinity, waves, winds, dissolved oxygen, etc.) data from the Pacific Northwest coastal ocean and estuaries. Ocean circulation model forecasts including sea surface temperature, surface currents, winds, and waves are also available. Resources for educators, including lesson plans using the data, are being added every month.

http://coastwatch.pfeg.noaa.gov/coastwatch/CWBrowser.jsp -- **CoastWatch West Coast Regional Node** provides remotely sensed SST, CHL, wind data, etc. for the entire US west coast. At this website, a user can select the region, data set and time period that s/he is interested in and download the data in many different formats such as ASCII, KML, NetCDF, MAT and HDF. The format of most use to us is KML, which he calls "Google Earth".

http://www.stccmop.org/CORIE/ -- **Columbia River Environment (CORIE)** is a pilot environmental observation and forecasting system for the Columbia River. Within the Observation Network link, shipboard and buoy data are accessible. Buoy station data include real time water temperature, salinity, and conductivity. Archived buoy data from up to 15 days prior is available. Shipboard data includes real time, when vessel is active, and archived salinity and temperature measurements from CORIE's fleet.

www.estuaries.gov/estuaries101/ScienceData/Default.aspx?ID=289 -- **Estuaries 101** allows you to use Archived and Real-time Data to Teach about Estuaries

http://serc.carleton.edu/usingdata/datasheets/MBARI.html -- Introduces educators to the classroom use of oceanographic data from the **Monterey Bay Aquarium Research Institute (MBARI)**. MBARI provides near real-time, quality controlled data on surface and subsurface temperature and salinity; CO2 and O2 concentrations; and relative fluorescence, used by scientists to better understand the Monterey Bay ecosystem and draw parallels to the ocean as a whole.

Geoscience Data

http://volcano.oregonstate.edu/ -- **VolcanoWorld** brings modern and near real time volcano information to specific target audiences and other users of the Internet. VolcanoWorld draws extensively on remote sensing images (AVHRR, Landsat TM, Magellan, Gloria, etc.) and other data collections.

http://serc.carleton.edu/usingdata/datasheets/BroadbandSeismic.html -- **Exploring Broadband Seismic Data in the Classroom** provides instructions for educators on the classroom use of seismic data from the Broadband Seismic Data Collection Center (BSDCC). BSDCC collects and distributes seismic data from several regional networks and instrument deployments, which are used by scientists to provide digital recordings of high-resolution seismic data for earthquakes and as a source of real-time data.

http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/quakes_all.php **-- Latest Earthquakes in the World - Past 7 days (**This list contains all earthquakes with magnitude greater than 2.5 located by the USGS and contributing networks in the last week (168 hours). The most recent earthquakes are at the top of the list.)

http://portal.earthscope.org:8080/gridsphere/gridsphere -- The **Earthscope Data Portal** provides a means for students, researchers and others interested in scientific data to simultaneously explore EarthScope's various instrument networks, as well as seamlessly download data from multiple stations and instrument types.

Weather and Climate Data

http://amrc.ssec.wisc.edu/realtime.html -- The **University of Wisconsin-Madison's Antarctic Weather Stations Project** and Antarctic Meteorological Research Center offers archived and real-time weather data and displays for the Antarctic.

http://cirrus.sprl.umich.edu/wxnet -- **WeatherNet** provides access to thousands of forecasts, images, and the largest collection of weather links. This is a comprehensive and up-to-date source of weather archived and real-time data. WeatherNet is sponsored by the Department of Atmospheric, Oceanic and Space Sciences at the University of Michigan

http://rsd.gsfc.nasa.gov/goes -- This site provides **GOES satellite images and data**, as well as resources on weather satellites in general. GOES is a US geostationary weather satellite.

http://www.weather.gov/view/national.php?thumbs=on -- **Interactive Weather Information Network** This page provides access to National Weather Service information for the entire United States.

http://ingrid.ldgo.columbia.edu/ -- The **IRI/LDEO Climate Data Library** contains a wide variety of oceanographic and atmospheric data including topography, sea surface temperature, salinity, oxygen and other oceanographic variables. For help on using these data, consult their Introduction to Climate Data and Examples sections.

http://www.rap.ucar.edu/weather/ -- **The National Center for Atmospheric Research** provides real-time weather data. View cloud images as seen from space by geostationary satellites.

http://hmsc.oregonstate.edu/weather/wxlinks.html -- **The Hatfield Marine Science Center** provides additional weather links. Archived wind, temperature, pressure, and precipitation data summaries from HMSC can be found at http://hmsc.oregonstate.edu/weather/summaries/index.html