Real-Time Data Resources from Ocean Observing Systems

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Please note that this resource list is still in draft form. We welcome all comments, suggestions, edits and additions. Please direct all comments to sage@marine.rutgers.edu.

What is an Ocean Observing System?

One hundred years ago, oceanographers studied the ocean and the life within it by venturing out on ships. In order to discover what was happening within the ocean, they would often literally throw a bucket over the side of the ship and analyze what came back. While these types of experiments expanded our knowledge of the ocean, scientists soon discovered that the ocean is a large, complex and dynamic environment. To gain a better understanding of the ocean, they would need a lot more than a few buckets, and they would need to find a way to monitor the ocean at all times, even during large storms when few people would venture out, or if they did, return alive.

As instruments, communication networks and even ships improved throughout the twentieth century, scientists were able to collect more and more complex datasets over larger areas and longer time periods. This new knowledge aided our understanding of physical, biological, chemical and geological processes in the ocean. But because many of these processes are interrelated, scientists need a way to study more than just one thing at a time. As a result scientists turned to elaborate networks of sensors to record many parameters at many places all at once in order to understand these complex relationships in the ocean. This convergence of sensors and technology has lead to the rise of "Ocean Observing Systems."

Just as weather agencies have networks of metrological stations, weather radars, radiosondes and satellite sensors that help them record and predict the weather, ocean observing systems are now building networks of underwater cabled observatories, surface buoys, coastal radars, autonomous profiling floats and gliders, and satellite sensors of their own. All of this data is sent back to shore and in many cases is made available in real-time on the Internet where scientists, resource managers, educators, students and the recreating public can view and use it too.

By concentrating instruments within specific areas, and by amassing large collections of data from several instruments over time, scientists are able to study the complex issues facing the world today, including climate change, harmful algal blooms, recovery from oil spills, human-induced pollution, and maritime safety. Ocean observing systems are allowing us to observe the ocean form more angles than ever before, and are helping us to increase our oceanographic knowledge.

About this List

This resource lists was originally compiled as part of a NERRS/IOOS focus group study addressing the needs of educators wishing to use real-time data in their classrooms. Many participants requested an annotated list of currently available real-time oceanographic datasets that could be effectively and easily used in a classroom setting. While this list is by no means complete, it emphasizes those sites, datasets and visualizations that are potentially most engaging for K-12 audiences.

Sites selected for inclusion on this list generally meet the following criteria.

1. The site provides access to *real-time environmental data* (primarily ocean data, but some weather and water quality site are also included), which is collected in an observatory context (i.e. the data can easily be related to other datasets to address meaningful scientific issues that can be translated to an educational audience).
2. The datasets presented have been collected for some time and are likely to continue being collected and made available on the web (strictly research-oriented sites are generally not included).
3. The web site provides useful data visualizations and a relatively strait-forward user interface.

If you would like to comment or add to this list, please contact Sage Lichtenwalner (sage@marine.rutgers.edu).

1 Regional Ocean Observing Systems

A national initiative is currently underway to set up Regional Associations and affiliated OOS across the country. While several regional centers are currently in operation, the sites below showcase the best coastal and oceanographic datasets available.

In most cases these sites are geared towards researchers and hence they link to a variety of datasets, not all of which may be appropriate for classroom audiences. Additionally, the interfaces are not always intuitive or easy to use (user interface development of course is another area of active research). However, if you are looking for specific measurements available in your region, these sites are a good place to start. Additionally, they may be useful if you would like to compare similar datasets between regions,

- **NOAA NowCoast** (National Data Portal) – http://nowcoast.noaa.gov
  Through a fairly straight-forward mapping interface, a user can plot weather measurements taken at hundreds of sites across the country, along with recent satellite and weather radar images. The interface also links to hundreds of real-time physical meteorological, oceanographic, river, and air/water quality stations. In addition, the map can be used to query links to local weather forecasts for major estuaries, seaports, and adjacent coastal regions as well as the Great Lakes.
- **Alaska** – http://ak.aoos.org/observing_system_components.php
  While this site is currently in its development stage, it already contains an interactive map interface that provides access to an extensive list of real-time data layers, including 1) buoys and coastal stations, 2) surface current maps, 3) web camera links, and 4) weather and marine forecasts. The site also features time-series plotting tools for buoy stations as well as raw data downloads.
- **Central and Northern California** – http://www.mbnms-simon.org/sections/obs/data_links.php
  This site provides links to a variety of ocean and coastal datasets available in northern California and Oregon, including satellite, surface currents, metrological data from buoy and shore stations, and animal tracks from Pacific pelagics.
- **Southern California** – http://sccoos.org/interactive-map
  On this site, you can quickly locate oceanographic data (i.e. from buoys, satellites, ocean surface currents, wave forecasts, water quality, etc.) available in Southern California. Resources are categorized by instrument and regional zones. Two interesting features: 1) Shore stations data is available for download, and 2) when you click on vectors on the surface current maps, a time-series of currents at the point pops up.
- **Great Lakes** – http://www.glos.us/
  Links to water level, metrological and buoy data are provided.
- **GOMOOS** – http://gomoos.org
  The Gulf of Maine contains an extensive array of buoys which collect a number of physical and biological (i.e. chlorophyll) parameters in real-time. The web site features 1) time-series plots and maps of real-time buoy data so you can compare measurements in time and space, 2) a comprehensive tool for selecting and plotting archived data, 3) short-term animations of surface currents and wave forecasts, and 4) links to regional oceanographic models and real-time satellite data.
- **SEACOOS** – http://seacoos.org/Data Access and Mapping
  Covering the entire SE United States from North Carolina to the panhandle of Florida, this site specializes in providing maps of data from shore stations, buoys and satellites. For simple studies, real-time static maps are available, while those wishing to delve further can explore the "Interactive Map" which provides a fully customizable interface allowing a user to pan-and-zoom, navigate through time (to access archived data) and toggle various layers on and off. While some educational resources are available on the site, they are mostly unrelated to the ROOS data.

For a more complete list of Regional Associations and Regional Ocean Observing Systems, check out http://www.usnfra.org.

2 Remote Sensing Satellites (Temperature, Ocean Color, Winds & more)

The best view of the ocean, of course, is from space. So scientists have long launched satellites hundreds of miles above the Earth's surface hoping to gain a better view of the ocean. A variety of sensors have been placed on satellites to measure the land, ocean and atmosphere of the Earth, but the most common oceanographic datasets available are:

1. Sea surface temperature (SST),
2. Ocean color, including chlorophyll concentration, turbidity (sediment concentration), and so-called "true color" or "RGB" images that resemble a photograph taken from space,
3. Sea surface height (SSH) and height anomalies (SSA) which is the difference from climate norms and is useful for determining "geostrophic" currents, and
4. Satellite-derived atmospheric winds.

Satellite data is primarily map-based in nature. Hence most visualization interfaces focus on generating static maps over designated regions. Sometimes maps are generated at irregular intervals corresponding to when the satellite passes over a given area. For geo-synchronous satellites (like the GOES weather satellites) maps are generated at more regular intervals. Additionally, because clouds often block the ocean from the satellites' view scientists will construct daily or monthly "composites," which is similar to averaging. They my also do this to study long-term changes. A climatological average, which is calculated from many years of data, often several decades, can be used to generate "anomaly" plots, which show the difference between a certain time and what one would expect based on its long-term average. When viewed as an animation, composites, means or anomaly plots can help show seasonal or multi-year trends.

- **NOAA Coast Watch** – http://coastwatch.noaa.gov/interface/interface.html
  The national Coast Watch site features a simple interface for searching their extensive satellite image library, which includes SST, Ocean Color and Satellite Winds from a number of pre-defined regional areas, including many US coastal zones.
- **Near-Real-Time Image Distribution Server** – http://nereids.jpl.nasa.gov
  This well-designed site from NASA's Jet Propulsion Laboratory provides global and regional real-time images of SST, SSH, winds, and ice cover, presented in an easy to use site.
- **East Coast SST & Ocean Color** – http://marine.rutgers.edu/cool/sat_data
  Rutgers Coastal Ocean Observation Lab's satellite page features quick access to real-time and archived SST and Ocean Color maps for over 20 regional East Coast areas (of varying sizes). Archived data for some areas date back to 1993 (i.e. New York Bight). Some areas also have daily composites available that simplify the number of images available and may be easier to interpret for younger audiences looking at long-term trends. SST/Codar Overlay maps (see surface currents below) are also available for the NJ coast and NY Harbor, and can be used to demonstrate how oceanic "fronts" can show up in both SST and surface currents.
- **California SST & Ocean Color** – http://sdcoos.org/data/modis/modis_california.cfm
  This Scripps site features an easy interface to access recent real-time SST and Chlorophyll maps for several regions in California.
- **Florida/Caribbean SST & MODIS** – http://imars.usf.edu
  IMaRS at USF features several tools for viewing SST and Ocean Color data, including the ability to import any of their maps into Google Earth. When viewing an SST map, a user can click on a point to obtain its temperature value. Users can also create their own customized monthly SST animations. The MODIS data archive includes SST, Chlorophyll and True Color maps for regions covering much of the east coast.
- **NASA Earth Observatory** – http://neo.sci.gsfc.nasa.gov/Search.html
  This new site from NASA features global SST and Chlorophyll maps which can quickly be browsed using their online map interface, or the maps can be viewed using Google Earth. Monthly composites are available and are recommended for educational purposes, as they are easier to interpret, especially when studying global patterns.
- **Earth Observatory Global Animations** – http://earthobservatory.nasa.gov/Observatory
  NASA's premiere public data site includes several tools for browsing datasets like SST, Chlorophyll, SSH and more. Much of the data is not in real-time, but is generally available within a few months. Students can use this site to easily generate custom animations to study global patterns.

3 Coastal HF-Radar (Surface Currents & Waves)

High-frequency (HF) radio waves (near the AM radio band) can be used to measure the surface currents and waves of the ocean. Data collected from a network of shore antennas can be used to generate maps of surface currents in the coastal ocean up to 140 miles offshore (depending on the frequency used). These maps typically use arrows to

indicate the direction of current flow, and often times the color or size of the arrows indicates speed. Such maps are more suited for higher-grade students who are familiar with vectors.

For cognition purposes, ocean currents can essentially be considered the "wind" of the ocean, and since atmospheric winds are the predominant forcing factor of ocean currents in the coastal zone, comparisons between the two will typically show strong correlations (though tides, storm surges and topography also play a role).

Some research groups are currently experimenting with additional products derived from these systems, including waves, near-shore currents (i.e. 1-dimensional along-shore flow), and particle trajectories which convert the vector representations to more intuitive representations of ocean movement.

- **Rutgers Codar** – http://marine.rutgers.edu/cool/codar.html
  Real-time currents in the NY Harbor area (so called standard-range) and along the entire NJ coast (long-range) are available. A nice animation tool allows users to browse forward and backward in time, or to navigate directly to a specific date. Additionally, the "Nearshore" product on the long-range page and the "New York Harbor Outflow" on the standard-range pages provide simplistic 1D representations of localized currents, suitable for classroom use.
- **Southern California Codar** – http://sccoos.org/data/surfacecurrents
  Vector maps on this site feature mouse-overs that show data values at individual points. Additionally, when points are clicked, a one-week time-series plot of current speed and direction is shown, demonstrating how currents on the map can change over time.
- **Monterey Bay Particles** – http://newark.cms.udel.edu/~brucel/realtimemaps
  This page features a "drifter simulation" that demonstrates the relationship between current vectors and particle movements.
- **Ocean Currents** – http://oceancurrents.us
  A comprehensive listing of HF-Radar sites throughout the country. The network is growing very quickly!

4 Buoys and Shore Stations

To study changes in local environments, scientists use buoys or land-based stations outfitted with meteorological and in-water instruments. Because the atmosphere and ocean are intimately linked, it is important to collect basic weather data, over land and water, as part of the observatory array. Sensors in the water can provide information on current flows and water quality. Buoys are also used to relay information from underwater sensors to satellites for transmission back to scientists on shore. By collecting data at buoys and stations over long periods, long-term changes can be observed as well as the impact of short-term events on the local ecosystem.

- **NERRS Monitoring Sites** – http://cdmo.baruch.sc.edu
  Provides access to real-time and archived water quality and weather data from over two-dozen Estuarine Reserves across the nation. Real-time data can be observed as time-series plots or gauges. User-generated archive plots and raw data downloads are also available.
- **Caro-COOPS** – http://carocoops.org
  Weather and water data from an array of coastal buoys off South Carolina are available on this well designed and easy-to-use site. Surface weather, water temperature, salinity, currents and more, are easily viewed in real-time gauges, recent time-series plots, or from a fully customizable archive data interface.
- **National Data Buoy Center** – http://www.ndbc.noaa.gov
  Easy access to real-time weather and wave data from buoys and coastal stations around the world. Data can be quickly downloaded and imported into Excel.
- **MySound** – http://www.mysound.uconn.edu
  Weather, wave and water quality data from several buoy stations in Long Island Sound.
- **COMPS** - http://comps.marine.usf.edu
  Weather and water data on the West Florida Shelf.
- **Texas Automated Buoy System** – http://tabs.gerg.tamu.edu/Tglo
  Winds and currents from buoys off the Texas Coast.
- **Eyes on the Bay** - http://www.eyesonthebay.net
  A comprehensive web site containing real-time water quality monitoring data for the Chesapeake Bay, along with several lesson plans.

- **Chesapeake Bay Observing System** – http://cbos.org
  Access real-time data from several buoys in the Chesapeake Bay. Users can create custom plots using the "Data Center" tool.
- **USGS Streamflow Conditions** - http://waterdata.usgs.gov/nwis/rt
  This site provides real-time streamflow data from hundreds of rivers across the nation. Maps show current streamflow conditions, and provide easy access to recent plots of streamflow and groundwater levels. Unfortunately, archived data is sometimes hard to get to.
- **Great Bay Buoy (New Hampshire)** – http://www.cooa.sr.unh.edu/buoydata/buoy.jsp
  While this site only features real-time data from a single buoy data near Portsmouth, NH, it is noteworthy to investigate because of the innovative way the real-time data is shown in relationship to climatological means.
- **Alabama Water Watch** – https://aww.auburn.edu
  Water quality data for several rivers in the state of Alabama.
- **Tidal Predictions & More** – http://tidesandcurrents.noaa.gov
  This newly revised site features an excellent tool for creating graphs of tidal predictions, and comparing predicted tides with actual sea level measurements. Water measurements are available from NOAA's coastal stations and PORTS system, and sea level trend plots provide for interesting study.

5 Underwater Nodes

In the past, when scientists wanted to deploy instruments on the seafloor, they would have to use large battery packs to power their instruments, and wait months until the instrument was recovered to see their data. Cabled observatories are eliminating these two restrictions. A cabled node is essentially long extension cord that contains both power and communications lines. Researchers are able plug in their instruments into a node and directly communicate and control their instruments on the seafloor, retrieving data back in real-time. Only a few such observatories have been built, and most do not yet run year-round. However, plans are in the works to install several more within the next few years.

- **LEO-15** – http://marine.rutgers.edu/cool/leodata.html
  First installed in the mid-1990's, this prototype node contains bottom wave and water sensors and an automated profiling sensor package that travels up and down the water column to measure vertical changes.
- **Martha's Vineyard Coastal Observatory** – http://mvcodata.whoi.edu/cgi-bin/mvco/mvco.cgi
  Provides real-time weather and water data off the Massachusetts coast.

6 Robotic Vehicles

Over the past few years, several new Autonomous Underwater Vehicles (AUV) have been developed, adding a new instrument to oceanographers' arsenal.

1. Drifters float in the ocean following ocean current patters, and regularly transmit their position to satellites.
2. Profiling drifters float at a fixed depth in the ocean and periodically ascend to the surface, collecting data along their way up, which is then transmit to satellites along with their current position.
3. Gliders change their buoyancy to travel up and down in the water column and a pair of fixed wings provides forward momentum so they can move horizontally through the ocean. When they surface, they transmit the data they collected back to control centers, and can be reprogrammed remotely to alter their mission.
4. Remotely operated vehicles (ROV) are typically used for short duration experiments where precise navigation and quick travel are required. Data is typically collected by downloading data from the instrument once it is returned to the lab.

All of these platforms can carry a suite of miniaturized physical and bio-optical instruments to remotely measure water properties like temperature, salinity, and the amount of light in the water column. Since these technologies are still relatively new, few observing groups regularly post data to the web.

- **Rutgers Slocum Gliders** – http://marine.rutgers.edu/cool/auvs/
  An elaborate research portal to archive and display data from Rutgers' glider fleet. Measured data include temperature, salinity, sound speed occasionally bio-optical transect measurements, as well as maps of glider tracks and depth average currents. While Rutgers has deployed gliders for short-durations all over

the world, a multi-year data-set along the "Endurance Line" off New Jersey provides a unique perspective for studying the seasonal cycle along a vertical slice of the ocean.

- **Scripps Spray Glider** – http://spray.ucsd.edu/
  Archived glider transects from experiments conducted by Scripps.
- **Global Surface Drifter Program** – http://www.aoml.noaa.gov/phod/dac/dac_reports.html
  Generated maps of drifter locations and calculated ocean currents.
- **Profiling Floats** – http://www.coriolis.eu.org/cdc/default.htm
  Data access site for ARGO profiling drifters.

7 Animal Tracking

Most of the observatory datasets listed so far have focused on physical measurements of the ocean or on optical measurements of small biological organisms like phytoplankton. By also studying large marine organisms, such as whales, turtles, dolphins, salmon and tuna, scientists can learn more about the marine ecosystem, studying both the top and bottom of the food chain. Understanding the migration and feeding patterns of marine organisms helps policy makers manage fisheries better.

To track large animals (like turtles, whales and sharks) scientists attach a temporary radio transmitter to the animal that can be detected by satellites when the animal surfaces, thus reveling the animal's current location in real-time. Sometimes scientists also use data-loggers, which track an animal's depth (along with other factors like temperature and salinity) to study how the animal forages for food on its dives. In coastal areas, small acoustic transmitters can be surgically inserted into organisms (like stripped bass, flounder and sharks), which in turn can be tracked by using an array of hydrophones (underwater microphones) that listen for when fish are nearby.

- **StriperTracker** – http://stripertracker.org/
  Geared specifically towards classroom audiences, this site features several lesson plans to help guide students through the real-time tracing data on over 100 striped bass within the Great Bay Estuary in New Jersey. Many of the fish were sponsored by.
- **WhaleNet** - http://whale.wheelock.edu/Welcome.html
  Real-time tracking maps of Atlantic seals, turtles, dolphins and more are available on this site, along with educational pages for students and resources for teachers. Also includes an "ask the scientist" section.
- **Tagging of Pacific Pelagics** – http://las.pfeg.noaa.gov/TOPP_recent/
  Real-time tracks of sharks, seals and turtles in the Pacific Ocean are shown overlain on maps of SST and Chlorophyll. This site is ideal for studying the feeding and migration patterns of different species and how these might related to temperature and food availability.
- **Sea Turtle Tracking** – http://www.seaturtle.org/tracking/
  Another good site with an archive of turtle tracking maps and information. Some teacher resources are available.
- **Signals of Spring** – http://www.signalsofspring.net
  Developed by NASA, this educational program contains many lesson focused on marine and terrestrial animal tracking.

8 Ocean & Atmospheric Models

One of the primary uses of observatory data is to assist in the development of ocean, atmospheric and ecosystem (biological and chemical) models. Measurements are made to help understand physical and biochemical processes. Relationships are translated into mathematical formulas from which a computerized model can make predictions. But measurements are also required to "initialize" models, that is, to setup the current conditions of the ocean or atmosphere being modeled, from which future predictions can be made from. Climate models study very long-term trends in the ocean/atmosphere system. A key benefit of observatories is that they collect long-term datasets, which are necessary to understand global climate interactions.

Most models are developed and used for research purposes. When a model is successful, it may be transitioned to an operational model, or incorporated into another model altogether. To date, relatively few oceanographic models are run in real-time. The following sites provide a few examples of some of the real-time atmospheric and ocean models currently available on the web.

- **Weather Underground** – www.wunderground.com
  This comprehensive site contains a collection of weather forecast information, including a variety of maps and weather data. The site also features real-time weather data collected from thousands of locations across the country, including many schools. The section on Tropical Weather is often regarded as one of the best places to obtain visualizations and data on hurricanes, and the "Flash Tracker" there is well designed.
- **Rutgers Weather Forecasts** – http://marine.rutgers.edu/cool/weather/WRF/
  This site features a concise collection of experimental weather forecast maps for the Mid-Atlantic region.
- **West Florida Shelf** – http://ocgmodel.marine.usf.edu/~ruoying/nowcast.html
  http://ocgmod1.marine.usf.edu/WFS/
  Two easy to use sites that show forecast data from oceanographic models for the eastern Gulf of Mexico. Note the particle trajectory views that demonstrate the cumulative effect of currents over time.
- **Wave Watch** – http://wavewatch.com/
  Geared especially to surfers, this site includes forecasts of weather and surf conditions, presented in a flashy manner.
- **Storm Surf** – http://stormsurf.com/
  Contains a variety of forecasts, data and tutorials all geared towards the needs of the surfing community.
- **NY Harbor** – http://onr.dl.stevens-tech.edu/webnyhos3/
  Ocean model forecast maps (temperature, salinity, currents) for New York Harbor and the NJ coast from Stevens Institute of Technology.

9 Educationally Focused Sites

The following sites are focused towards an education audience, and while they typically do not include real-time observatory data, several of the sites features lessons that link to observatory sites for data analysis.

- **Education and Research: Testing Hypotheses (EARTH)** – http://www.mbari.org/earth/
  An excellent source of teacher-created lesson plans that incorporate real-time oceanographic data available on the web.
- **COOL Classroom** – http://coolclassroom.org
  A student-centered site that contains several lessons on ocean observatory related data and topics, including upwelling, using sea surface temperature maps, the ocean food web, and ocean technology.
- **CIESE** – http://www.ciese.org/realtimeproj.html
  Features several online student labs of real-time data on variety of subjects, including weather, air pollution, the Gulf Stream, etc. CIESE also runs several collaborative projects throughout the year in which students share and compare the data they collect with other schools.
- **The Bridge** – http://www.vims.edu/bridge
  Contains an extensive of educational resources for teachers, and a monthly "data-tip," which is an activity ready for classroom use that encourages students to work with data (though typically not real-time).
- **USF Remote Sensing Lessons** – http://education.imars.usf.edu/
  A new site containing several lessons on how remotely sensed data is collected and used to coral reefs and other subjects.
- **Educational Distance Learning** – http://www.edlonline.org
  An online portal for teachers and students that contains lesson plans and data tools incorporating oceanographic data from the West Florida Shelf.
- **AMS DataStreme Ocean** – http://www.ametsoc.org/amsedu/DS-Ocean/index.html
  A professional development program that focuses on using and interpreting real-time ocean datasets.
- **AMS Water in the Environment** – http://www.ametsoc.org/amsedu/WES/home.html
  A professional development program which focuses on understanding weather and using real-time weather data and forecast models.
- **WeatherBug Achieve** – http://www.weatherbugachieve.com
  A full weather-based curriculum that features online learning modules containing lessons and quizzes that utilize real-time metrological data (subscription required).
- **WISE** – http://wise.berkeley.edu/
  An online learning environment wherein teachers can direct students through a variety of guided inquiry lessons, some of which feature real-time (student collected) Earth Science data.

- **Water on the Web** – http://waterontheweb.org/
  A high-school level curriculum that focuses on water quality data from streams throughout the country
- **NASA Earth Observatory** – http://earthobservatory.nasa.gov/
  On this site, you can find daily intriguing images from satellites, space shuttles and research projects on Earth Science related topics, all of which include informative explanations.
- **Our Ocean World Podcasts** – http://www.ouroceanworld.com/2001/oceanworld.htm
  A daily podcast of interesting stories in the oceanographic world.
- **Student Data Mapper** – http://kangis.org/mapping/SDM/
  A resource tool to design web-based polls that incorporate geographic data.
- **MapZone** – http://mapzone.ordnancesurvey.co.uk
  A excellent UK based educational site with many interactive modules and games to help students learn about maps, geography and GIS.

10 Additional Resources

For more links to ocean-related data, check out these resource lists:

- The Bridge's Online Data Resources – http://www.vims.edu/bridge/data.html
- DLESE - http://www.dlese.org
  A comprehensive database of oceanographic and Earth science resources specifically geared towards educators.
- Gulf Stream related data links – http://www.science-house.org/nesdis/gulf/links.html
- Google Earth Ocean Resources – http://www.justmagic.com/GM-GE.html
- Near Real-time Data Products – http://rammb.cira.colostate.edu/wmovl/VRL/WebProducts/Web%20based%20products.htm

And here are a few miscellaneous sites that offer interesting datasets and visualizations.

- Historical Hurricane Tracks – http://hurricane.csc.noaa.gov/hurricanes/Run.html
- Google Earth Blog (Weather Archives) – http://www.gearthblog.com/blog/archives/weather/