

Hello Steve,

Please accept this extremely delayed response to your inquiry regarding software, data types, and data resources related to paper and electronic charts and maps for marine science. Your initial email is quite complete and has many of the items I would have included. Below I've taken the liberty of re-organizing the resources you provided and added on a few. Please take all my suggestions with the caveat that I am most definitely a non-marine specialist! As a long term strategy, a central data storage and access server would be a critical component of any overall GIS infrastructure. It is my goal to make the GIS data currently available in the Geisel GIS Lab available over the web with authentication and to do so effectively will require a spatial server.

I hope this is helpful, even though it is so long in coming.

--Tracey Hughes, GIS Coordinator, UCSD Geisel GIS Lab

## Agencies & Resources

The agencies and resources listed in this section do not necessarily have GIS-ready data. Rather, they have resources that can be applied or transformed into GIS data. All of these resources have not been fully explored and should be used more as starting points than certain data sources.

- National Oceanic and Atmospheric Administration (NOAA)
  - o Web Index of NOAA agencies & groups – ([http://oceanservice.noaa.gov/Products/web\\_index.html](http://oceanservice.noaa.gov/Products/web_index.html))
  - o National Data Buoy Center (<http://www.ndbc.noaa.gov/>)
  - o Tidal data for the US (<http://tidesandcurrents.noaa.gov/tides07/>)
  - o National Ocean Data Center (<http://www.nodc.noaa.gov/>)
  - o Coastal Services Center (<http://www.csc.noaa.gov/>)
  - o National Ocean Service (<http://oceanservice.noaa.gov/>)
  - o Coral Health and Monitoring Project – (<http://www.coral.noaa.gov/index.shtml>)
  - o Satellite and Information Services – GIS-ready satellite data from the GOES satellite (<http://www.gis.ssd.nesdis.noaa.gov/>)
  - o COOS – Currently offline. (<http://www.csc.noaa.gov/coos/>)
  
- United States Geological Survey (USGS)
  - o Real Time Water Data (<http://waterdata.usgs.gov/usa/nwis/rt>)
  - o Western Coastal and Marine Geology Data Seismic Data – ([http://walrus.wr.usgs.gov/NAMSS/year\\_table.html](http://walrus.wr.usgs.gov/NAMSS/year_table.html))
  
- Office of Naval Research
  - o Naval Research Laboratory, Stennis Space Center. Satellite derived winds, wave height, sea-surface temperature and sea-surface height. (<http://www7300.nrlssc.navy.mil/altimetry/index.html>)
  
- NCAR
  - o Unidata – (<http://www.unidata.ucar.edu/data/>)
  
- US Army Corps of Engineers
  - o Web server to access GIS data directly through ArcGIS – (<https://rsgis.crrel.usace.army.mil/corpsmap/>)
  
- United States Environmental Protection Agency
  - o Facilities or sites under regulation ([http://www.epa.gov/enviro/geo\\_data.html](http://www.epa.gov/enviro/geo_data.html))
  
- National Weather Service - Interactive Weather Information Network. Nationwide weather watches and warnings. (<http://www.weather.gov/view/national.php?thumbs=on>)

- IOOS (<http://www.ocean.us/>)
- Davey Jones' Locker – Seafloor Mapping/Marine & Coastal GIS: Dawn Wright's website full of resources for marine/coastal GIS. (<http://marinecoastalgis.net/>)
- Marine GIS – Data links page appears very good (<http://www.marinegis.com/index.html>)
- EarthTrends – Part of the World Resources Institute, this site has good information related to marine science and some GIS data available for download (<http://earthtrends.wri.org/index.php>)
- UCSD Geisel GIS Lab – GIS data is currently only available while in the GIS Lab in Geisel Library. Have majority of SanGIS and SANDAG data files ready to go in GIS with metadata as part of data. Imagery of San Diego County soon to come as is a global GIS data bundle (<http://govinfo.ucsd.edu/gis/>)
- Area Specific Resources
  - o SCOOP – Southeastern Universities Research Association (SURA) Coastal Ocean Observing and Prediction (SCOOP) Program (<http://scoop.sura.org/>)
  - o Florida Fish and Wildlife Research Institute – has ready to go Florida marine GIS data – ([http://ocean.floridamarine.org/mrgis/Description\\_Layers\\_Marine.htm](http://ocean.floridamarine.org/mrgis/Description_Layers_Marine.htm))
  - o Gulf of Mexico Ocean Observing Systems (<http://comps.marine.usf.edu/gom/>)
  - o Gulf of Mexico Coastal Ocean Observing System (GCOOS) (<http://www-ocean.tamu.edu/GCOOS/gcoos.htm>)

## General GIS Resources

- Guides to GIS Data
  - o University of Arkansas Libraries (<http://libinfo.uark.edu/GIS/us.asp>)
  - o Stanford University Libraries (<http://www-sul.stanford.edu/depts/gis/web.html>)
  - o Harvard College Libraries (<http://hcl.harvard.edu/research/guides/cartography/resources/online.html>)
  
- Geospatial Clearinghouses & Data Portals
  - o Geospatial Onestop (<http://gos2.geodata.gov/wps/portal/gos>)
  - o National Spatial Data Clearinghouse (<http://clearinghouse1.fgdc.gov/>)
  - o GIS Data Depot (<http://data.geocomm.com/>) – the Library will be purchasing a higher level membership to the GIS Data Depot so that we can do ‘premium’ downloads here
  - o Geography Network (<http://www.geographynetwork.com/>) – best way to access this site is through ArcMap using the server connection. In this way, the GIS data can be instantly usable in ArcGIS
  - o USGS EROS Data Center (<http://edc.usgs.gov/>)
  - o The National Map (<http://nationalmap.gov/>)
  - o NGA Geospatial Engine([http://earth-info.nga.mil/geospatial/digital\\_products.htm](http://earth-info.nga.mil/geospatial/digital_products.htm))
  - o The Harvard Geospatial Library (<http://peters.hul.harvard.edu:8080/HGL/jsp/HGL.jsp>) – From this site you can select a geographic area, then scroll down to search for GIS data within that geographic area. If there is downloadable data, it will be on the list and the user saves the datasets they are interested in and can download them. Available data is fairly limited, with the primary data sources as the Digital Chart of the World and Census/TIGER data.
  - o Alexandria Digital Library (<http://clients.alexandria.ucsb.edu/globetrotter/>) – Using a Google Maps API, this site offers searching and download capabilities for GIS data.
  - o Global Land Cover Facility, Earth Science Data Interface (<http://glcfapp.umiacs.umd.edu:8080/esdi/index.jsp>) – Search and download imagery for the globe here. Mostly Landsat imagery available but other data is available. The FAQ section has good information regarding file format conversions.
  - o UNEP Environmental Data Portal (<http://geodata.grid.unep.ch/>) – Excellent data resources from UNEP, with majority of data available for free download.
  - o gData (<http://biogeo.berkeley.edu/bgm/gdata.php>) – Created by UC Berkeley, this site offers free downloadable GIS data for almost every country in the world.

**Land-Based GIS Resources**

- USGS Topographic Data
  - 1:24,000 quads for all of the United States held by UCSD Libraries on CD
  - Available for download through the National Map
  - Format: Tiff DRG (digital raster graphic)
  
- ESRI Topographic Data
  - Available in Geisel GIS Lab.
  - 1 kilometer digital elevation model for North America
  - Format: GRID raster
  - 2 minute by 2 minute elevation & bathymetry data for the globe based on etopo2 from the National Geophysical Data Center (NGDC) ETOPO2 Global 2' Elevations data set from September 2001
  - Format: GRID raster
  
- SRTM (Shuttle Radar Topography Mission) 90m DEM (Digital Elevation Model), covers the World from Latitude 57 South - 61 North
  - Format: .bil with a shapefile index of the tiles. Also will have available in ASCII GRID format readable directly by ArcGIS
  
- VMAPO, Version 5
  - Format: Shapefile
  - 1:1,000,000 scale vector data that includes data on:

contours  
airports  
canals  
barriers  
bathymetry  
city areas  
city points  
coast lines  
crop areas  
danger points  
fish hatcheries  
grass areas  
highways  
industry areas  
industry points

lakes  
land ice  
misc pop points  
misc transmission  
lines  
misc water lines  
native settlements  
ocean sea areas  
pipelines  
place names  
political boundaries--  
lines, areas and  
points  
power plants  
rail roads

rail yards  
rivers  
roads  
sand areas  
sea ice  
spot elevations  
storage points  
swamps  
trails  
transportation lines  
transportation points  
tree areas  
tundra areas  
utility lines

## GIS-Related Marine Data (Subjects & Format Types Specified)

### - **Nautical Charts**

- NOAA (<http://nauticalcharts.noaa.gov/mcd/Raster/download.htm>)
  - Format: Raster BSB
  - In the future, NOAA plans to distribute the same RNC images in a geoTIF format, but these will not be considered as NOAA RNCs™, are not updated for Notices to Mariners, and do not conform to the S-61 Standard.
  - Files can be read in ArcGIS with the Chart Viewer extension downloadable at <http://www.csc.noaa.gov/products/chartview/index.html>
- C-MAP by Jeppesen (<http://www.c-map.no/>)
  - Format: CM-93/3
- C-MAP-ENC (Official Electronic Navigational Charts) (<http://www.c-map.no/>)
  - Format: SENC
- BSB by Maptech (NOAA charts packaged by Maptech) (<http://www.maptech.com/water/index.cfm?CFID=3679080&CFTOKEN=56178683>)
  - Format: Raster .kap or .cap with a bsb file as well
  - Cap files can be read by ArcGIS with free downloadable extension at <http://www.maptech.com/support/doc.cfm?plid=58&docid=118>

### - **Marine Boundaries**

- VLIZ Global Maritime Boundaries Geodatabase – (<http://www.vliz.be/vmdcdata/marbound/index.php>)
- Global Maritime Boundaries Database (*Order to be submitted to vendor by the UCSD Libraries by year end 2007 if the free VLIZ data is not sufficient or accurate*)
  - Format: Shapefile
- World Vector Shoreline Plus (1:250,000 scale vector data of the World's coastlines and international boundaries – *Received by the UCSD Libraries and being prepared to be mounted on GIS server. Available in the next month or so for use by all of UCSD.*)
  - Format: Shapefile

### - **Tides**

- NOAA tidal data for the US (<http://tidesandcurrents.noaa.gov/tides07/>)
- Proudman tidal data for the UK and Ireland (<http://www.pol.ac.uk/ntslf/tides/?port=0056>)

### - **Fish/Fisheries**

- Available as part of the VMAP0 Global GIS Data Bundle in the Geisel GIS Lab

### - **Ports**

- Global Maritime Ports Database – available for \$250 - <http://www.gd-ais.com/Capabilities/offerings/sr/GGDP/GMPDDescription.html>)

- **Imagery**
  - o Global GIS Data Bundle available in Geisel GIS Lab
    - + Landsat 7 ETM 15m 7-4-2 GeoCover 2000 (1999 - 2003) worldwide satellite imagery
      - Format: MrSID
    - + Landsat 4/5 TM 30m 7-4-2 GeoCover 1990 (1988 - 1992) worldwide satellite imagery
      - Format: MrSID

### **Additional Resources to be Explored for Marine GIS**

- Government Hydrologic Offices
- Departments of Environmental Protection
- Universities in the region of interest

### **Additional Coastal Research Facilities**

- University of South Florida Coastal Ocean Monitoring & Prediction System (COMPS) – (<http://comps.marine.usf.edu/>)
- Coastal and Marine Resources Centre – Cork, Ireland – (<http://cmrc.ucc.ie/>)
- Florida Institute of Oceanography – (<http://www.marine.usf.edu/FIO/>)
- Woods Hole Oceanographic Institute – (<http://www.whoi.edu/>)

**As an important side note that doesn't cleanly fit into any of the categories in this document, NetCDF files should be addressed.**

NetCDF is a common scientific data file format which can be integrated into ArcGIS using custom tools. Some of these tools are available as open source tools on the web, such as those available at <http://hebel.net/>. The Wikipedia entry for NetCDF (<http://en.wikipedia.org/wiki/NetCDF>) has quite good information on the file type and software applications to view NetCDF files.

### GIS-Related Marine Software

Product	Viewer	Load Own Data	Online/Desktop Installation	Extra Notes	Cost
ArcExplorer	Yes	Yes (some ESRI file formats)	Online with small exe file required	Minimal analysis capabilities	Free
Google Earth & Google Earth PRO*	Yes	Yes (KML, rasters, and shapefiles also with PRO)	Online with small exe file required	No analysis capabilities. Very easy to share data.	Free for Google Earth PRO is free if obtained through Education Initiative. Details at <a href="http://govinfo.ucsd.edu/gis/GIS_Resources.html#GE_PRO_Software">http://govinfo.ucsd.edu/gis/GIS_Resources.html#GE_PRO_Software</a>
National Map by USGS	Yes for USGS data including nautical chart data	No	Online	Can download GIS data. Interactive mapping tool.	Free
TheMAP	Yes	?	?		Must pay for. More info at <a href="http://www.chartworx.com/products_themap1000">http://www.chartworx.com/products_themap1000</a> .
ECDIS, VTS & high performance ECS	Yes	?	?	Reader for C-Map files	?
ArcGIS Desktop Suite	Yes	Yes	Desktop install	Can work on Mac if it can operate Windows	\$1000 for 3 – 10 copies in a lab. More info at <a href="http://software.ucsd.edu/productfiles/esri-arcinfobrochure.shtml">http://software.ucsd.edu/productfiles/esri-arcinfobrochure.shtml</a> .

This list should include a NetCDF viewer of some sort to be more complete.