DATA ACCESS TUTORIAL
2012 OCB PI Summer Workshop

DATA access: catalog browse

SCENARIO 1: you are a former US JGOFS or US GLOBEC researcher, and you know what data you are looking for

Go to: http://usjgofs.whoi.edu/jg/dir/jgofs/

select/click on Process Studies
http://usjgofs.whoi.edu/jg/serv/jgofs/Process_Studies.html0%7Bdir=usjgofs.whoi.edu/jg/dir/jgofs/,info=usjgofs.whoi.edu/jg/info/jgofs/Process_Studies%7D

select Arabian Sea INVENTORY
URL: http://usjgofs.whoi.edu/jg/serv/jgofs/arabian/INVENTORY.html0

select cruise ID TTN043 (Thomas Thompson cruise 43)

/jgofs/arabian/INVENTORY ---- Level 0

Directory  Documentation  Download & Other Operations

Level 0  Next Level  Flat Listing

# Arabian Sea Inventory
# version December 16, 2002
# DMO note: March 2007: added links to data entities
# October 2008: added TTN39 cruise data links
# Notes regarding data not yet submitted to U.S. JGOFS Data Management Office
# n = no data available; y = data available from relational database
# n1 = data not submitted; DI retired prior to submitting data
#
#---------------------------------------------------------
# ship    cruise_id  cruise_name
#---------------------------------------------------------
# nd      Arabian Sea nd
# T Thompson TTN039  InterCal
# T Thompson TTN443  Process1
# T Thompson TTN445  Process2
# T Thompson TTN463  Process4
# T Thompson TTN500  Process5
# T Thompson TTNUS3  Process6
# T Thompson TTNUS4  Process7
About 12 rows down in the data inventory list, select “bottle” for the Niskin bottle nutrient data http://usigofs.whoi.edu/jg/serv/jgofs/arabian/tnn-043/bottle.html

Explanation of buttons in the data system:

- **Next Level**: expands the data to the next level of detail
- **Documentation**: displays the supporting documentation for this dataset
- **Data Display**: returns to data display from documentation display
- **Directory**: displays (returns to) the Data Directory listing for this cruise
- **Download & Other Operations**: options for download, subsetting and reformatting of data

You would follow a similar process for US GLOBEC data, but you would start with the data server for that program: http://globec.whoi.edu/jg/dir/globec/

and selecting the relevant project of interest from the US GLOBEC data categories:
- Georges Bank: http://globec.whoi.edu/jg/dir/globec/gb/
- Northeast Pacific: http://globec.whoi.edu/jg/dir/globec/nep/
- Southern Ocean: http://globec.whoi.edu/jg/dir/globec/soglobec/
**Data access: TEXT-BASED SEARCH**

**SCENARIO 2:** you are familiar with the way BCO-DMO organizes data, and you have some idea of what data you are looking for

Go to: [http://bco-dmo.org](http://bco-dmo.org)
Select DATA from the top navigation area

The DATABASE links in the left navigation area provide an idea of how the data are organized. Data sets are grouped by Program (largest collection), Project (smaller in scope than a Program), Deployment (cruise, mooring, and many other examples), Dataset (a logical collection of data).

To locate the same US JGOFS data set that we found in the first scenario, one could start with any of the depending on what you know about the data of interest. For example, if you know you are interested in US JGOFS data, start at the top level “Programs”.

Select Programs from the left navigation area.
Enter JGOFS in the search box. Click the **Search programs** button.
Select “U.S. Joint Global Ocean Flux Study” from the Program list.
URL: [http://osprey.bco-dmo.org/program.cfm?flag=view&id=2&sortby=program](http://osprey.bco-dmo.org/program.cfm?flag=view&id=2&sortby=program)
Your browser display should look like this, showing a brief description of US JGOFS.
Scroll down and expand the Projects section from “Additional program information”.
URL: http://osprey.bco-dmo.org/program.cfm?flag=viewp&id=2&sortby=program

Select US JGOFS Arabian Sea from the list of project names.

Browser displays the project description page.
URL: http://osprey.bco-dmo.org/project.cfm?id=7&flag=view

Scroll down that page and expand the Datasets section.

URL: http://osprey.bco-dmo.org/project.cfm?flag=viewd&id=7&sortby=project
Select the data set of interest from the list, in this case “bottle”.
URL: http://osprey.bco-dmo.org/dataset.cfm?id=10257&flag=view

From the bottle dataset display page, expand the **Deployments** section below to access data from all of the Arabian Sea cruises during which Niskin bottle data were collected.
URL: [http://osprey.bco-dmo.org/dataset.cfm?id=10257&flag=view](http://osprey.bco-dmo.org/dataset.cfm?id=10257&flag=view)

Locate the cruise of interest from the Deployment list, in this case TT043. **DO NOT CLICK ON ANYTHING YET.** Did you click? If so, use the Browser BACK arrow to return to URL: [http://osprey.bco-dmo.org/dataset.cfm?id=10257&flag=view](http://osprey.bco-dmo.org/dataset.cfm?id=10257&flag=view)

**IMPORTANT:** to access the data, select the **data info** link on the right in the TT043 row.

See the screen shot on the next page ...

Explanation: From the expanded list of Deployments from which Arabian Sea bottle data were contributed, one can follow several links. Deployment **TT043** is a link to information about that cruise. Platform **R/V Thomas G. Thompson** is a link to information about that vessel. The Investigator names, **Codispoti** and **Morrison** are links to information about those people.

Also note that some table columns (blue text) are sortable, e.g. **Start date**
More information about this dataset:

- Funding
- Deployments

<table>
<thead>
<tr>
<th>Deployment</th>
<th>Synonyms</th>
<th>Start date</th>
<th>Platform</th>
<th>Investigator</th>
<th>data info</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT039</td>
<td>TTN039</td>
<td>Sep 18, 1994</td>
<td>R/V Thomas G. Thompson</td>
<td>Louis Codispoti (Principal Investigator)</td>
<td>data info</td>
</tr>
<tr>
<td></td>
<td>TN39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTN-039</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TT043</td>
<td>TTN043</td>
<td>Jan 8, 1995</td>
<td>R/V Thomas G. Thompson</td>
<td>Louis Codispoti (Principal Investigator)</td>
<td>data info</td>
</tr>
<tr>
<td></td>
<td>TN043</td>
<td></td>
<td></td>
<td>John Morrison (Co-Principal Investigator)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTN-043</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TT045</td>
<td>TTN045</td>
<td>Mar 14, 1995</td>
<td>R/V Thomas G. Thompson</td>
<td>Louis Codispoti (Principal Investigator)</td>
<td>data info</td>
</tr>
<tr>
<td></td>
<td>TN045</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTN-045</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OK - now! Select the data info link on the right in the TT043 row.

URL: http://osprey.bco-dmo.org/datasetDeployment.cfm?ddid=1447&did=353&flag=view

Your browser display of the bottle data from cruise TT043 should look like this ...

Dataset: bottle  Deployment: TT043

- Get Data
- Map it

**Principal Investigator:** Louis Codispoti (Old Dominion University)

**Co-Principal Investigator:** John Morrison (North Carolina State University)

**Data version:** December 16, 2002

**Version date:** 16 December 2002

**Data validated:** yes

**Dataset handle ID:**

- **Project:** U.S. JGOFS Arabian Sea (Arabian Sea)
- **Deployment:** TT043
- **Deployment synonyms:** TTN043, TN043, TTN-043
- **Coordinated deployments:**

**Current state:**

- **Description:** Hydrographic Data: temp, salinity, nutrients from Niskin bottles

- **Acquisition description**

- **Processing description**

- **People associated with this dataset deployment**
From this deployment-specific dataset display page, there are many options to display additional information about this dataset. Additional documentation can be accessed by selecting the clickable blue links or expanding the blue section headers.

However, we want the data …

For this dataset there are two choices: [Get Data] and [Map It]. At this point, please click the [Get Data] button to access these data online.

Browser displays URL: http://usjgofs.whoi.edu/jg/serv/jgofs/arabian/ttn-043/bottle.html in another window or browser tab depending on the browser configuration. This display should look familiar as it is the same dataset shown in Scenario #1.

If one returns to the previous browser window with the display of Dataset: TT043 bottle URL: http://osprey.bco-dmo.org/datasetDeployment.cfm?ddid=1447&did=353&flag=view clicking the [Map It] button would open this dataset in the MapServer data access system.

Click the [Map It] button, to launch the MapServer GIS for this dataset.

Click OK in the dialog box to confirm that you wish to launch the MapServer GIS with a specific dataset selected.
The browser opens a new window or tab, and the display should look similar to this for URL: http://mapservice.bco-dmo.org/mapserver/maps-ol/index.php?datasetId=10257&deployment=TT043

Some things to notice on the map shown above:
* The TT043 cruise track in light green, with the map zoomed in to see the Arabian Sea region.
* Up top, the MapServer is in “BROWSE map” mode.
* Because we launched the MapServer from the text-based data discovery system, the only “Available deployment” (panel in the middle of the top half of the panel displays) is TT043, the one we had selected.

Once again, there are many ways to access additional information from this display:
* Clicking the + box to the left of the TT043 cruise ID in the “Available deployments” panel, displays metadata about that cruise.

To the right, still in the top half of the display, in the “Visible deployments” panel:
* Right click on the TT043 cruise ID to display available options for that cruise
* Clicking the + box to the left of the TT043 cruise ID displays cruise metadata including a link to the cruise report if one is available

Down below (right) in the “Datasets” panel:
* Clicking on the + symbol in the green circle, or anywhere on the row with the dataset name (Bottle) or cruise ID (TT043), requests that this dataset be ‘mapped’
Try it ... small colored dots should appear in the map panel to the left, and the Datasets panel on the right has shifted to a display of “Mapped datasets”, of which there is only one at the moment.
The single mapped dataset is listed, with a color coded dot, the dataset name (Bottle), a number (67) that indicates the number of sampling locations included in this dataset, from the selected cruise (TT043). Once again, we have several options:

* expanding the + symbol, shows the status of this dataset (it has been mapped)
* right-clicking anywhere on the text in the row with the dataset name pops up a menu with several options
  * view a tabular listing of the sampling locations, with options for data export
  * a link to view the full dataset online
  * the ability to change the color of the dots on the map
  * the ability to save/bookmark the MapServer link to this dataset (for later access)
  * and the ability to remove this dataset from the map (remove the dots)
  
Note that unchecking the box in this row also ‘removes this dataset from the map’.

The MapServer also provides the ability to generate ‘quick view’ plots of the data at a sampling location. On the map, select the dot for station 12, cast 3 (red arrow) to bring up a dialog box that offers: links to the data from the database and a way to select variables from the dataset to generate a ‘quick view’ X-Y plot.

Select: X-axis ‘O2_ml_L’ and Y-axis ‘depth’

Click “view and get data” to generate the plot on the next page of dissolved oxygen vs. depth.
Notice once again, several tabs at the top make it easy to view a tabular list of the data in the graph or download the data from the “File output tab”.

Acknowledgments

The MapServer interface is a custom implementation of the Open Source MapServer software developed at the University of Minnesota. The BCO-DMO MapServer system is the result of collaboration between programmer Charlton Galvarino (Second Creek Consulting, Columbia, SC) and BCO-DMO staff members. In particular, BCO-DMO marine biology data specialist, Dicky Allison has led this development effort. Funding for this work is provided by the National Science Foundation Division of Ocean Sciences and Office of Polar Programs.
**Data access: MAP BROWSE**

**Scenario 3:** you are interested in data from a particular geographic region

Go to: [http://bcodmo.org/](http://bcodmo.org/) the BCO-DMO home page

At the bottom of the DATABASE column on the left, click on the GEOSPATIAL ACCESS map to display the MapServer system map showing all the deployments from the BCO-DMO database.
The most common way to use the MapServer GIS is to define a region of interest on the map.

For example: you are interested in phytoplankton blooms in the North Atlantic.

Remember that the colored lines represent cruise tracks; symbols represent fixed sampling sites (e.g. mooring locations or time-series sites). Notice the orange cruise track just West of Europe (between the Labrador and North Sea in the vicinity of Ireland at 50° N 20° W.

Click the “Zoom in” button and then click and drag to define an area on the map.

Notice the available map positioning tools shown at right.

The default mode is Pan, and if using the “Zoom in” button you will need to put the “mapper” in Zoom mode each time if doing multiple zoom actions. Suggestion: once the area of interest has been selected using “Zoom in”, use the zoom tools (indicated by the red arrow).

Use the various map positioning tools (shown above right) until your map looks something like the screen shot below.

There is a lot of information displayed on this map and in the associated panels. We notice an assortment of cruise tracks (colored lines) and fixed sampling locations (colored triangle symbols). The map system offers several tools for figuring out what is being shown on the map. The map controls appear in a tool bar above the map.
To find out what cruises these are, use the Query tool (click on the Query button now). Then click on a colored item on the map. For example, click on that orange cruise track southwest of Ireland.

Look in the “Visible deployments” panel in the upper right of the browser window.

The list of visible deployments indicates that the selected navigation track is from a P3 aircraft flight done as part of the US JGOFS NABE basin study. The coastal sampling sites (series of dark red triangles) were established by the EuroWinter-2010 project. Want to know more about that project? Click on the boxed + symbol to the left of the dark red square on the “EuroWinter-2010” line. This opens a box that displays information about this deployment activity. Many more options are available by right-clicking on the “EuroWinter-2010” line.

But let’s find some data ...
Still in Query mode, click on the light green cruise track in the upper middle of the map. In the Visible deployments panel, this deployment is identified as KN193-03. Right click on the highlighted KN193-03 line in the Visible deployments panel, and select “View deployment metadata”.

This opens up a new browser window or tab with a view of the deployment metadata/documentation (shown on the next page).
View of KN193-03 deployment (cruse) metadata (documentation) retrieved by the MapServer from the BCO-DMO database.

Return to the map view, the browser window with this URL address:

Most likely this is in the browser tab that precedes the one you have been looking at with the deployment metadata (that looks like the screen shot above).

Now take the map out of Query mode by clicking on the “Pan” map tool button and click the “Clear query” map tool button to remove the red “X” from the map.

Let’s see what data the 2008 North Atlantic Bloom Experiment (NAB 2008) investigators have shared from their KN193-03 cruise.
In the “Datasets” panel (in the lower right of the browser window), select the Niskin Bottle dataset. Notice the pink dots that appear on the map.

Use the Zoom + tool to zoom in the map until the spatial extent looks similar to this screen shot (some additional dialog windows from the next step have already been opened and are visible in the image below).

Select the upper leftmost sampling location dot (indicated by the red arrow) to open up a KN193-03 Niskin Bottle Hydrography dialog window. From that dialog window, one can access the data in tabular form or as a ‘quick view’ plot.

First a quick plot to see what the data look like:

Keep “allox” on the X-axis, but select “depth” as the Y-axis.

Click the “view and get the data” link at the bottom of the dialog box.
A plot window opens showing the requested allox vs. depth plot clearly labeled to confirm that the plot is of KN193-03 Niskin Bottle Hydrography from cast 26.

The data can be downloaded using several different methods:

- from the map dialog box, one can view the data from the selected point, or use “Link to full dataset” to view a listing of all the records in the full data.

- Another option is to right click on the dataset line in the Datasets panel (to the right of the map display).
Right clicking the dataset name brings up the dataset options menu, from which one can export the data. Choose “View/export mapped data”.

In addition to the data table display, one has the option to download the data as CSV (comma-separated values) or KML (Google Earth) formatted files.
Data access: MAP KEYWORD SEARCH

Scenario 4: you are interested in data of a particular type

The MapServer has a KEYWORD search that is useful for finding certain types of data.

To test out the KEYWORD search function,
(1) click “Start over” in the top tool bar above the search panels and
(2) click the KEYWORD search menu item.

Enter something of interest in the “Dataset search string” text entry box.
For example, type in “pigments”.
Notice the result set of datasets that match this query appear in the window. Select the third one, “chlorophyll phaeophytin”.

The MapServer updates to show that these data have been reported from two deployments: OC404-01 and OC404-04. The cruise tracks are displayed on the map, and the datasets which could be grouped by “dataset” or “deployment” are listed in the bottom right “Datasets” panel.

The datasets have been discovered and at this point one can proceed to map the datasets and view them either online or in graph form.
Glossary of Terms

BCO-DMO  Biological and Chemical Oceanography Data Management Office
http://bcodmo.org/

GIS    Geospatial Information System; a map system to display spatial data

MapServer  Open Source software for publishing spatial data and providing interactive mapping applications via the Web
http://mapserver.org/

US GLOBEC  GLOBal Ocean ECosystems Dynamics research program
http://www.usglobec.org/

US JGOFS  United States Joint Global Ocean Flux Study
http://usjgos.whoi.edu/