EDC ENVIRONMENTAL DATA CONNECTOR
an extension for connecting ArcGIS to Thredds/OPeNDAP

Release Notes &
User's Guide
Version 1.3.7

Introduction

The Environmental Data Connector (EDC) is a tool that allows users to connect to THREDDS/OPeNDAP/SOS/ERDDAP servers and download environmental data.

It was developed for the National Oceanic and Atmospheric Administration (NOAA) Fisheries by RPS. Version 1.3.7 of the EDC is available in five versions: EDC for ArcGIS 10.4 or later, EDC for Matlab, EDC for R, EDC for Excel and EDC Standalone.

Required Programs

The following must be installed on your system prior to the EDC for ALL VERSIONS to work properly:

- **OpenJDK 11** or later
- Up-to-date video card drivers

ArcGIS 10:

- ArcGIS 10.4 or later
- .NET Framework 4

Matlab:

- Matlab 2008b to 2019b

R:

- R software for your platform, Version 2.14 to 3.3
- ncdf4 package for R (included with EDC install)

Excel:

- MS Excel 2007 or MS Excel 2010 (SP1)

.NET Framework 4.0 and more recent versions can be downloaded from Microsoft. Using a search engine enter '.NET Framework' to navigate to the most recent version.

At the time of this guide's publication .NET Framework could be downloaded from:
http://www.microsoft.com/en-us/download/details.aspx?id=17851

1. Release Notes for Version 1.3.7

1. EDC Java Client
    a. Upgraded the WorldWind Java library to version 2.2
    b. Removed the bundled Java 8 JRE from EDC. This new release requires OpenJDK version 11+ to be installed prior to EDC.

2. EDC Arc

    a. Upgraded to work with ArcMap version 10.8.1

2. EDC for ArcGIS10

Installation

The EDC for is available for download at
http://www.pfeg.noaa.gov/products/EDC or
http://www.asascience.com/software/downloads/

Instructions

- Remove all instances of the OpenGL 1.0 libraries from your computer (jogl and gluegen.jar files).
- If necessary, uninstall previous versions of EDC for ArcGIS.
- If using ArcGIS 10.3, make sure that the ESRIRegASM.exe configuration file is correct. Version 10.3 was released with an incorrect configuration file that needs to be updated prior to installing EDC. More information can be found here: http://support.esri.com/cn/knowledgebase/techarticles/detail/43712
- Run Setup.jar to begin installation.
- Click 'Next' to continue with the installation
- On the next page accept the license agreement and click 'Next' to continue with the installation
- On the next page ensure that *EDC Core* and *EDC Arc* are checked. Uncheck any versions of EDC that you do not want installed. Click 'Next'.
- On the next page select the install directory. Click 'Next'.
- On the next page review the selected installation options and click 'Next'.
- Wait for the selected components to install and click 'Next'.
- Wait for the configuration parameters to be set and click 'Next'.
- Click 'Done'
- On some systems it may be necessary to reboot your computer for the EDC configuration parameters to take effect.
- When the installation is complete open ArcGIS 10 and EDC will appear as a new menu in the main menu bar. If the 'Environmental Data Connector' menu item does not load the EDC GUI you will need to restart your computer.

Although registration is not necessary to download the EDC, we encourage you to register on this website if you would like to be informed when updates are made available. Installation instructions and this user guide are also available at this website.

Getting Started

To start the EDC, click the 'EDC' menu in ArcGIS and choose 'Environmental Data Connector'. The EDC will open in a new window. While the EDC is open, ArcGIS is locked and inaccessible. See the **Connecting to Data** in Section 4 of this document to learn how to find datasets and subset for downloading.

3. MATLAB

Installation

The EDC for Matlab is available for download at:
http://www.pfeg.noaa.gov/products/EDC or
http://www.asascience.com/software/downloads/

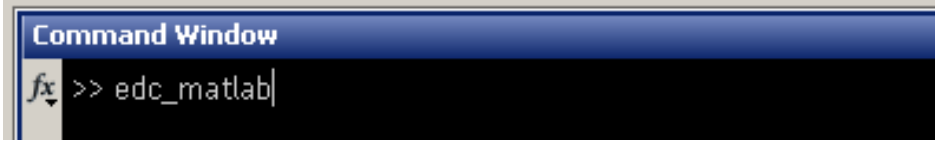
Instructions

1. Remove all instances of the OpenGL 1.0 libraries from your computer (jogl and gluegen.jar files).
2. If necessary, uninstall previous versions of EDC for Matlab.
3. Run Setup.jar to begin installation.
4. Click 'Next' to continue with the installation
5. On the next page accept the license agreement and click 'Next' to continue with the installation
6. On the next page ensure that *EDC Core* and *EDC Matlab* are checked. Uncheck any versions of EDC that you do not want installed. Click 'Next'.
7. On the next page select the install directory. Click 'Next'.
8. If the path to the matlab executable isn't automatically found, select the path yourself. A common path to the most recent Matlab installation on Ubuntu Linux is /usr/local/bin/matlab.
9. On the next page review the selected installation options and click 'Next'.
10. Wait for the selected components to install and click 'Next'.
11. Wait for the configuration parameters to be set and click 'Next'.
    a. Note: if a MATLAB Command Window with the message "Undefined function or variable 'matlabrc'" appears, you will have to manually run the 'install_edc.m' function. Open MATLAB and in the command window, and type "install_edc()" on the command line. This will close MATLAB, and when you reopen it, Step 14 will be possible.
12. Click 'Done'
13. On some systems it may be necessary to reboot your computer for the EDC configuration parameters to take effect.
14. You should now be able run the function "edc_matlab" from the Matlab command line

Although registration is not necessary to download the EDC, we encourage you to register on this website if you would like to be informed when updates are made available. Installation instructions and this user guide are also available at this website.

Getting Started

With a Matlab session open, type the command "edc_matlab" and hit enter:



This opens the EDC connector. See the **Connecting to Data** in Section 4 of this document to learn how to find datasets and subset for downloading. Once the data has been downloaded locally by the EDC, Matlab opens it up and puts it into a Matlab structure type. The structure has fields for each variable and for netcdf files, a field containing global attributes.

```
>> edc_matlab

ans =

  global_attributes: {61x2 cell}
          SGchla: [1x1 struct]
            time: [1x1 struct]
        altitude: [1x1 struct]
             lat: [1x1 struct]
             lon: [1x1 struct]
```

To save the data structure as workspace variable you can either call the edc_matlab command with the Matlab variable as output argument (chldata = edc_matlab;) or you can assign the temporary variable “ans” to permanent variable (chldata = ans;).

SOS in Matlab EDC

Data served with SOS through the EDC can be downloaded as sets of several stations. In this case the structure that is returned in Matlab contains fields for each station and within each station there are fields for each variable.

The user must select .csv (post process from DIF) as the download format for the Matlab EDC when returning SOS data.

Tabledap in Matlab EDC

Data served in Tabledap through the EDC is returned as a structure much like SOS, but with a single station field that represents the dataset.

The user must select .mat as the download format for the Matlab EDC when returning Tabledap data.

3. R

Obtaining R

R can be downloaded from the R project website.
There are a number of download mirrors for the US and abroad, so choose the one closest to your location.

http://www.r-project.org/

Installation

The EDC for R is available for download at

http://www.pfeg.noaa.gov/products/EDC or
http://www.asascience.com/software/downloads/

Instructions

1. Remove all instances of the OpenGL 1.0 libraries from your computer (jogl and gluegen.jar files).
2. If necessary, uninstall previous versions of EDC for R.
3. Run Setup.jar to begin installation.
4. Click 'Next' to continue with the installation
5. On the next page accept the license agreement and click 'Next' to continue with the installation
6. On the next page ensure that *EDC Core* and *EDC R* are checked. Uncheck any versions of EDC that you do not want installed. Click 'Next'.
7. On the next page select the install directory. Click 'Next'.
8. If the installation cannot find the path to RScript, the path must be provided. On Linux it is commonly located as /usr/bin/Rscript. On Windows provide the path to either the 32-bit or 64-bit RScript.exe
8. On the next page review the selected installation options and click 'Next'.
9. Wait for the selected components to install and click 'Next'.
10. Wait for the configuration parameters to be set and click 'Next'.
11. Click 'Done'
12. On some systems it may be necessary to reboot your computer for the EDC configuration parameters to take effect.

Although registration is not necessary to download the EDC, we encourage you to register on this website if you would like to be informed when updates are made available. Installation instructions and this user guide are also available at this website.

Getting Started

In the R console type:

```
library(ncdf4)
```

```
library(EDCR)
```

These commands will load the necessary packages (EDCR depends on ncdf4). To open the EDC connector, use the following command:

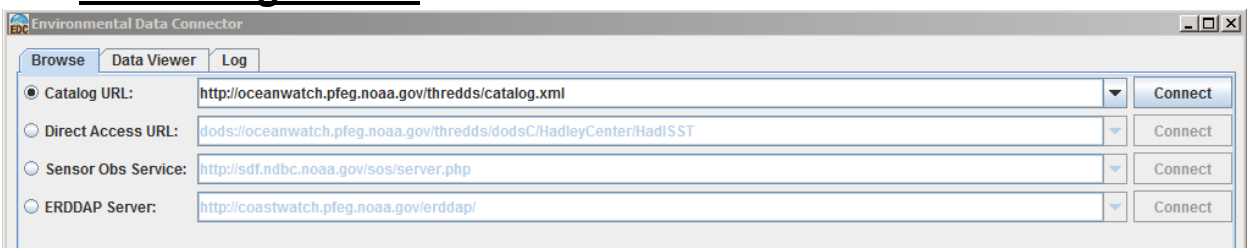
```
example1 <- EDC.get(1)
```

The argument “1” is required on some platforms to avoid the R tendency to print the function source code to the screen when no input arguments are supplied to a function. Please see the **Connecting to Data** in Section 4 for guidance on using the EDC for finding and downloading data. This returns a named list that contains the data values and metadata from the datasets.

You can use the following command to display the structure of the returned R object:

```
str(example1)
```

4. Connecting to Data

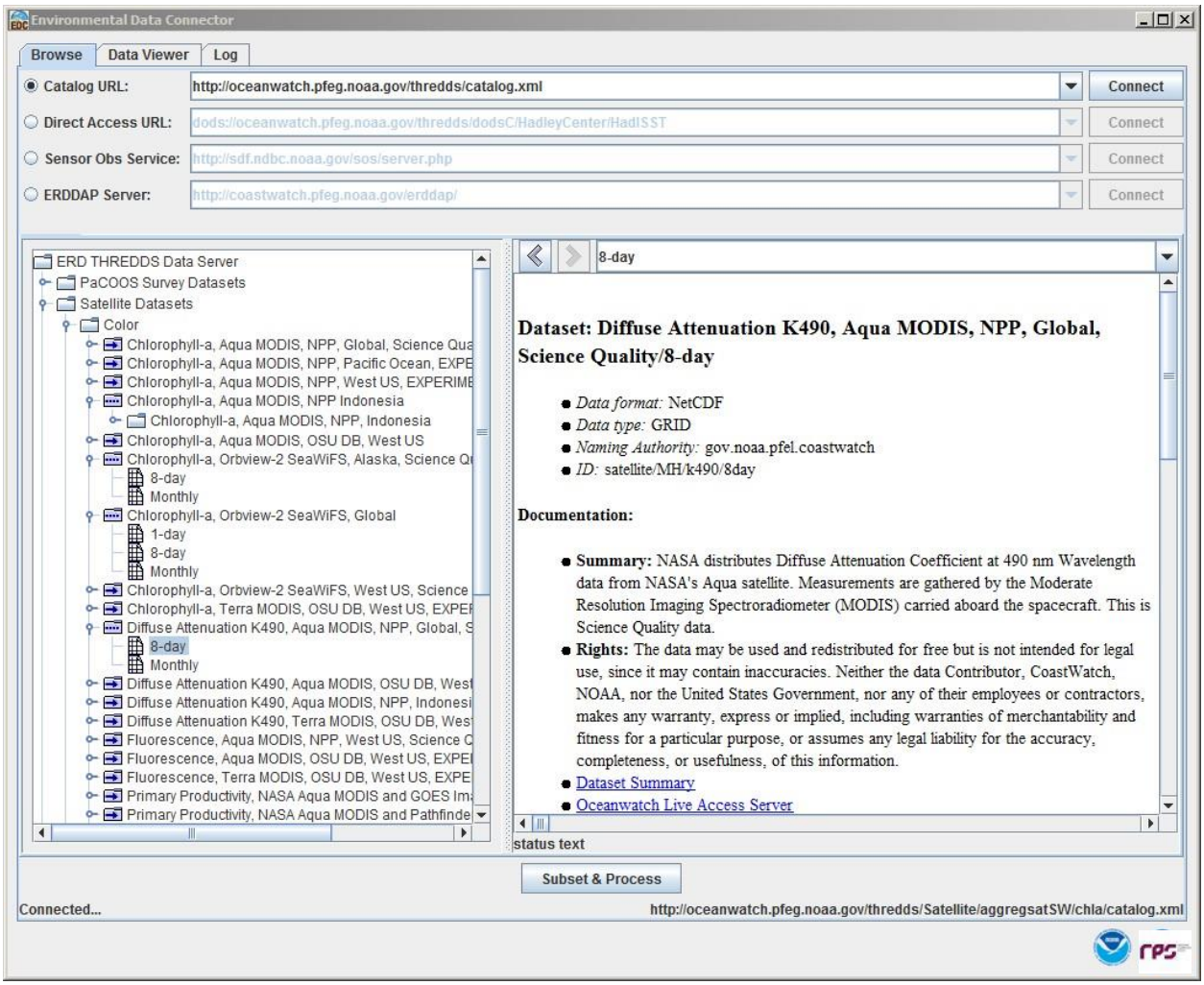


In the top portion of the EDC, you may select the data source. Valid data sources are include THREDDS data catalog URLs, individual OPeNDAP URLs, SOS service URLs, or ERDDAP URLs. The dropdown menus list some common sources for oceanographic and atmospheric data. You may select one of the catalogs or datasets in the dropdown menus or manually type in a different URL. The 'Catalog URL' connects to THREDDS dataset catalogs, while the 'Direct Access URL' connects to individual OPeNDAP datasets. Once you have selected a catalog, dataset, or service, click the 'Connect' button to connect to that dataset.

Catalog URL

If you connect to a data catalog, a directory tree will appear in the left hand side of the EDC showing the directory structure of the data catalog. Select the dataset you would like to download by navigating through this directory structure.

Once you have navigated to a single dataset, you will see that dataset's metadata in the main screen to the right of the directory tree. The amount of metadata will vary depending on the dataset and the data source.



Once you have navigated to your dataset of interest and reviewed the metadata, click the 'Subset & Process' button to connect to the dataset. Once the EDC connects to the dataset, a new tab window opens in the EDC. This tab has a 'Grid - Subset & Process' title. The 'Browse' tab is still visible, and you may click on this tab to display the catalog tree and connect to other datasets.

Continue to "Grid – Subset & Process"

Direct Access URL

Since the Direct Access URL option points to a single dataset, using this option automatically opens a new tab called 'Grid – Subset & Process' in the EDC.

Continue to "Grid – Subset & Process"

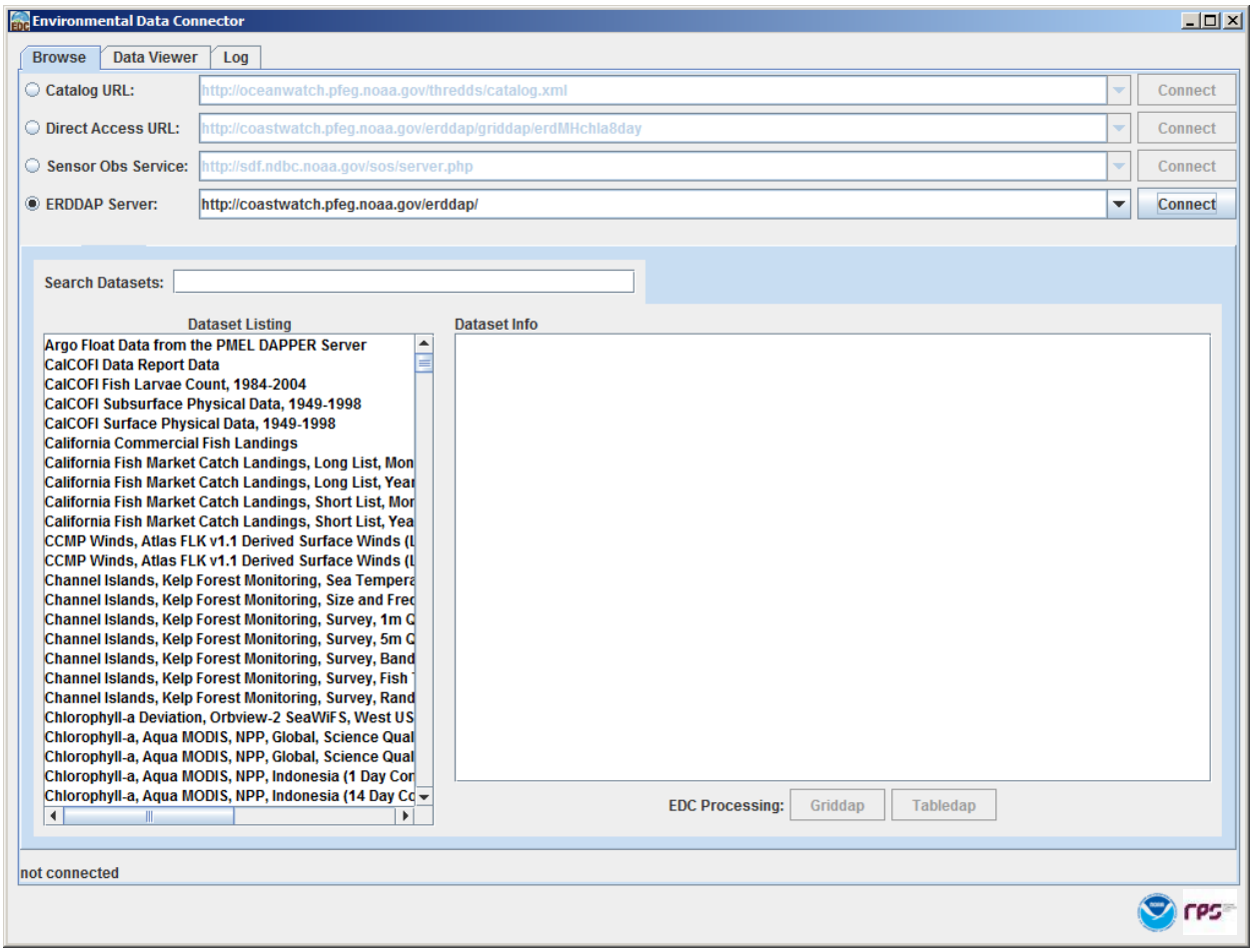
Sensor Obs Service

Connecting to an SOS service brings users directly to the "SOS – Subset and Process" tab, where users can choose sensors, timeframes and variables of interest.

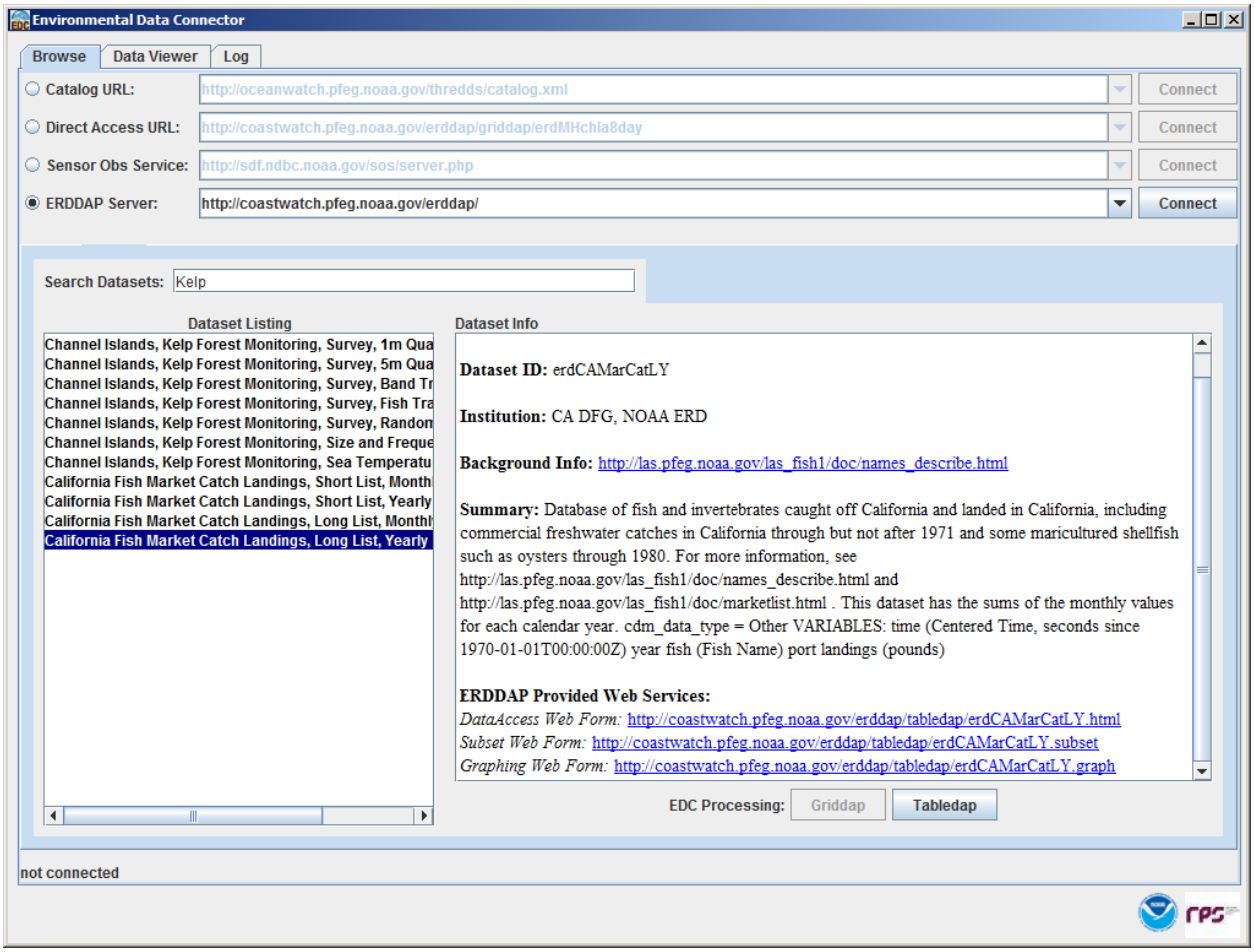
Continue to "SOS – Subset & Process"

ERDDAP Server

If you connect to an ERDDAP server, a listing of available datasets will appear on left hand side of the EDC. A text box above the listing allows for searching within these datasets. Select the dataset you would like to download by searching and scrolling through the list.



Once you have navigated to a single dataset, you will see that dataset's metadata in the main screen to the right of the directory tree. The amount of metadata will vary depending on the dataset and the data source.



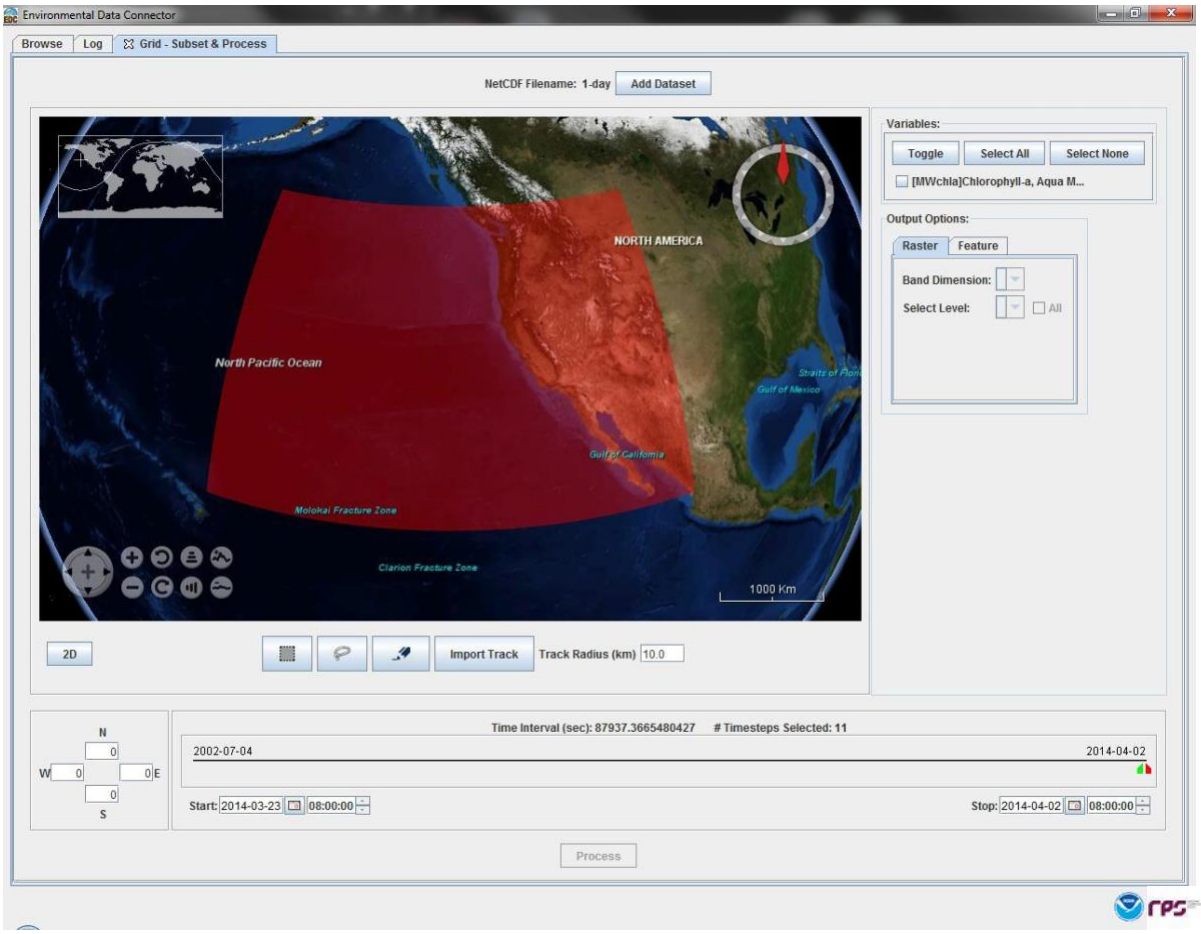
EDC processes ERDDAP data in two ways, using Griddap and Tabledap. You will see two buttons beneath the metadata description for each dataset you select. Only one of these buttons will be enabled at a time.

Once you have navigated to your dataset of interest and reviewed the metadata, click either the “Griddap” or “Tabledap” button to connect to the dataset. Once the EDC connects to the dataset, a new tab window opens in the EDC. The ‘Browse’ tab is still visible, and you may click on this tab to display the catalog tree and connect to other datasets.

If you selected “Griddap”, Continue to “Grid – Subset & Process”
If you selected “Tabledap”, Continue to “ERDDAP – Subset & Process”

Grid - Subset & Process

A map is shown with the maximum spatial extent of the dataset delineated by a red box.



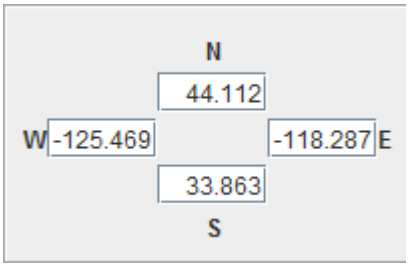
*Note: The EDC now supports datasets in both -180 to 180 and 0 to 360 coordinate systems.

Navigation

At the bottom left of the map is a navigation toolbar. This toolbar allows you to navigate around the map. You may zoom in or out and pan around the map. You can also adjust the tilt of the camera and the appearance of topography when in 3D mode.

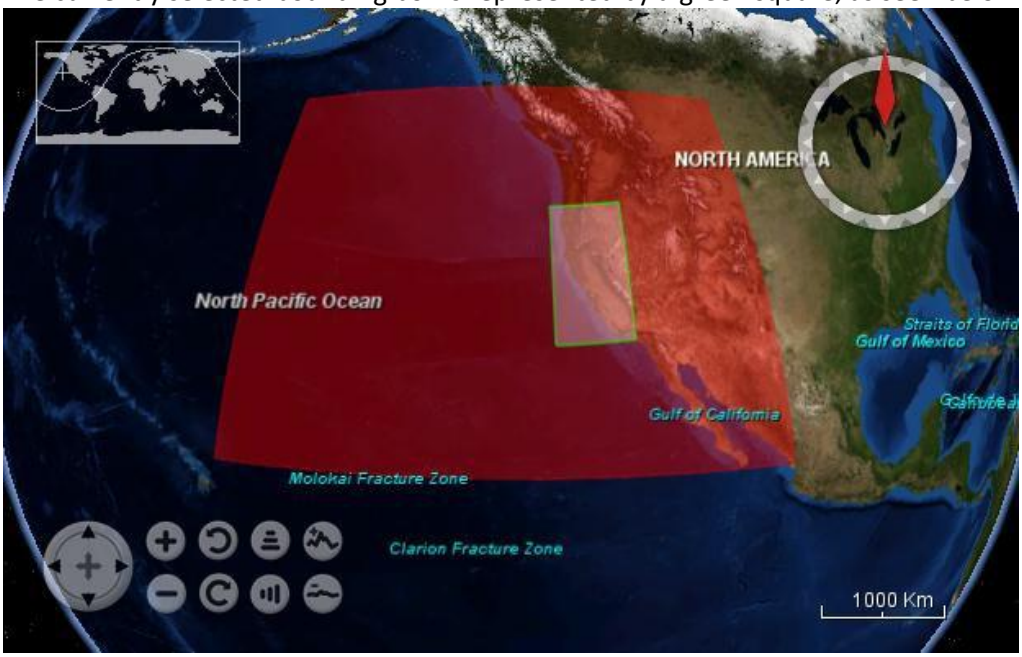
Selecting Spatial Limits

To select an area of interest, you may either manually enter the North, East, South, and West bounds into the provided text areas, draw a bounding box around the area with the Select by BBox tool, draw a polygon around the area with the Select by Polygon tool, draw a track line to select multiple areas, or import a predefined track line to select multiple areas.



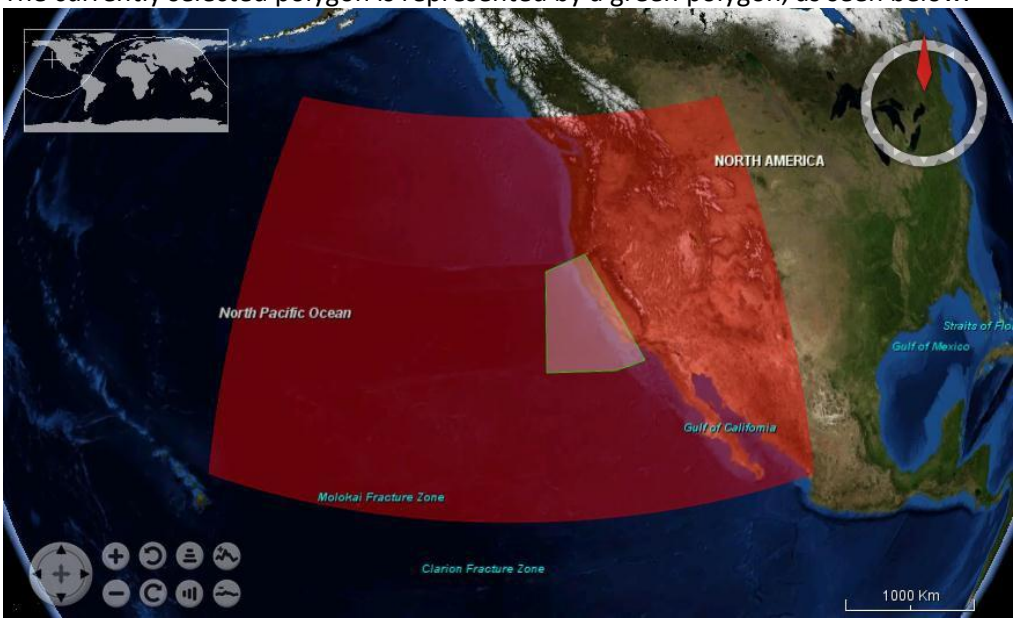
To draw a bounding box, click on the “Select by BBOX” button (as shown to the left). Once clicked, drawing mode is active and may click on the map and continue to hold down the mouse button while you move the mouse around.

The currently selected bounding box is represented by a green square, as seen below.

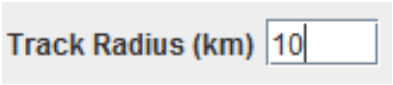


To draw a polygon, click on the “Select by Polygon” button (as shown to the left). Once clicked, drawing mode is active and may click on the map. Each click will add a vertex to the polygon. To end the polygon, double-click while adding the last vertex.

The currently selected polygon is represented by a green polygon, as seen below.

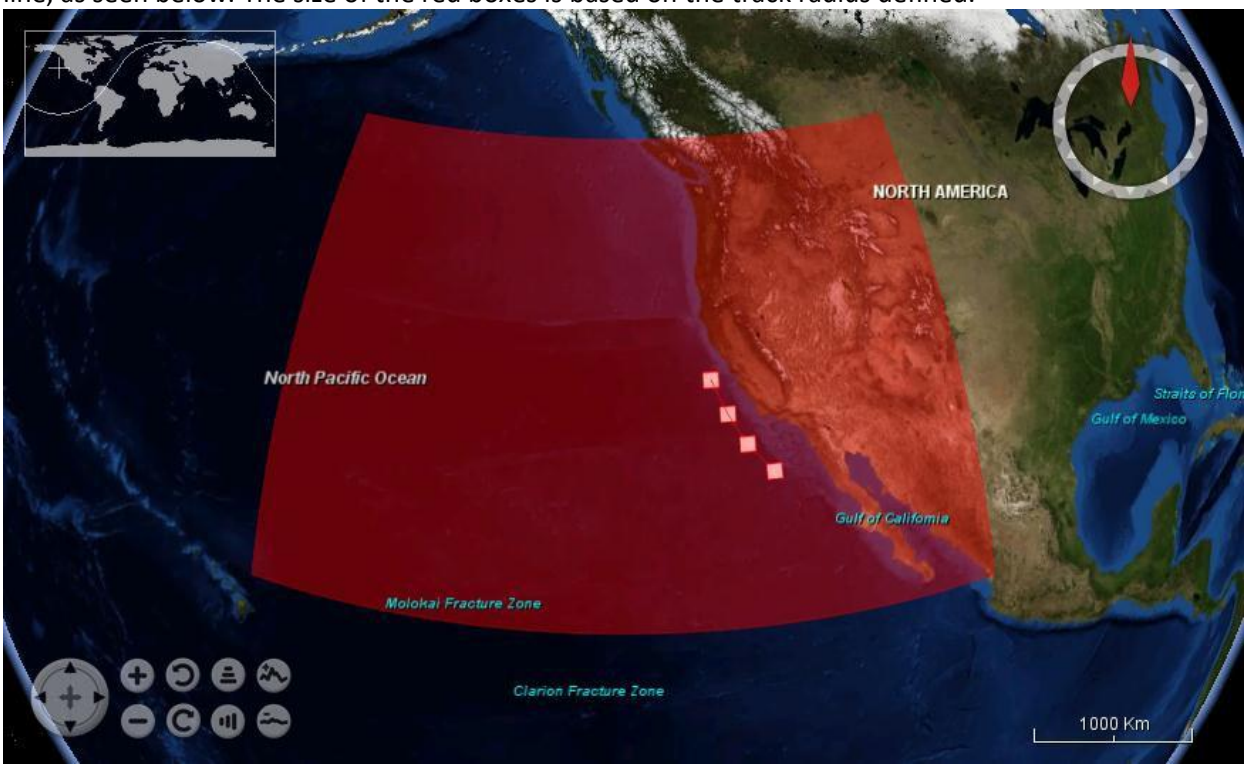


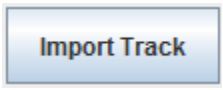
To draw a track line, click on the “Select by Track Line” button (as shown to the left). Once clicked, drawing mode is active and may click on the map. Each click will add a vertex to the track line and will indicate a location where data will be extracted. To end the track line, double-click while adding the last track point.



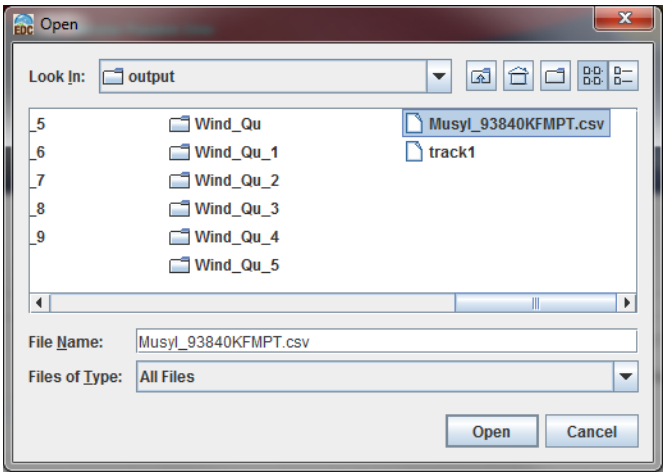
Adjust the track radius (in kilometers) to define the area around each track point for data to be selected within. After changing the number hit the Enter key, and the map will update.

The currently selected track line is represented by a red line and a red box for each point along the track line, as seen below. The size of the red boxes is based on the track radius defined.

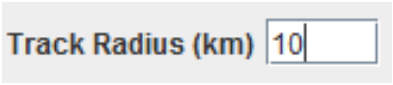




To import a track line, click on the “Import Track” button.



Once clicked, a dialog will open allowing you to browse to an existing track line file. Select the desired track line file and click Open. The track line and points should appear on the map.



Adjust the track radius (in kilometers) to define the area around each track point for data to be selected within. After changing the number hit the Enter key, and the map will update.

The currently imported track line is represented by a red line and a red box for each point along the track line, as seen below. The size of the red boxes is based on the track radius defined. See example above.

Track Line Format

A track line file must be a comma-separated text file. Each line in the text file contains a new point along the track line. Each point can have its own time extent. Each line can have the following fields, in this order:

1. Latitude – in decimal degrees
2. Longitude – in decimal degrees
3. Altitude – in meters (can be 0 if not using altitude)
4. Start Time – the beginning of the time range for data to be selected (**optional**)
5. Stop Time – the end of the time range for data to be selected (**optional**)

The start and stop time can be entered in a variety of formats. The allowed formats are described below. In these formats yyyy = year, MM = month, dd – day, HH = hour, mm = minute, ss = seconds, S = milliseconds, Z = time zone offset, and z =time zone name. Characters in single quotes should be entered as is (Z represents times in UTC).

- yyyy-MM-dd'T'HH:mm:ss'.'S'Z'
- yyyy-MM-dd'T'HH:mm:ss'.'SZ
- yyyy-MM-dd'T'HH:mm:ss'.'Sz
- yyyy-MM-dd'T'HH:mm:ss'.'S
- yyyy-MM-dd'T'HH:mm:ssZ
- yyyy-MM-dd'T'HH:mm:ssz
- yyyy-MM-dd'T'HH:mm:ss'Z'

- yyyy-MM-dd'T'HH:mm:ss
- yyyy-MM-dd'T'HH:mm'Z'
- yyyy-MM-dd'T'HH:mmz
- yyyy-MM-dd'T'HH:mm
- yyyyMMddHHmmssZ

Here is an example of a track line file:

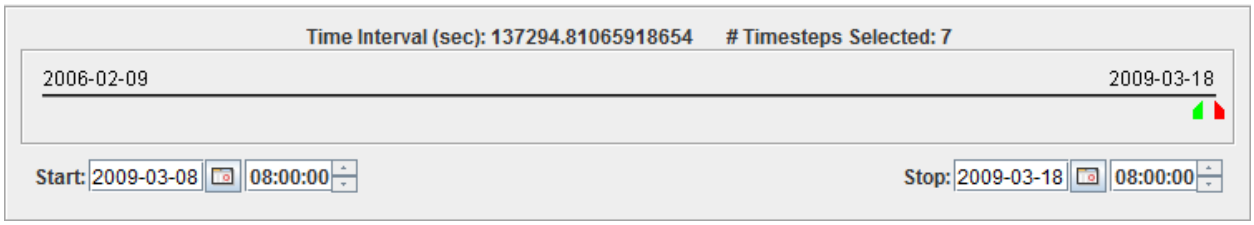
```
27.8036,-119.8914,0,2013-03-15T14:40Z,2013-13-15T14:40Z
28.7866,-117.9850,0,2012-03-15T14:40Z,2012-13-15T14:40Z
36.3951,-123.6461,0,2011-03-15T14:40Z,2011-13-15T14:40Z
35.2628,-125.9477,0,2010-03-15T14:40Z,2010-13-15T14:40Z
33.2628,-124.3501,0,2009-03-15T14:40Z,2009-13-15T14:40Z
```

When the start and stop time values are not provided the temporal limits are set using the time bar (described in the next section). This sets the same start and stop time for each of the track points. When these values are entered in the start track line file, the time bar is disabled (as shown below).

Unfortunately, the current release of the EDC cannot download data which spans the prime meridian (0° longitude). In order to get the entire region of data, you should download the data in two pieces: one piece with west longitude and one piece with east longitude. You may then merge the data in ArcGIS. Individual Raster Datasets can be combined using the **Mosaic to New Raster tool** found under Data Management Tools, Raster, Raster Dataset. Individual feature datasets can be combined using the **Merge** geoprocessing tool, found under the Geoprocessing menu in ArcMap.

Selecting Temporal Limits

Once you have defined the spatial area that you wish to download, define the time span of the data that you wish to download. This is done by manipulating the time bar at the bottom of the EDC. In the time bar, the green pointer represents the beginning time of the data to be downloaded, and the red pointer represents the ending time. You can also input start and end times manually. If you select a beginning time in the time bar that does not exactly coincide with a time in the dataset, then the EDC will download the closest previous timestep, as well as all the data that falls between the beginning and end times.



Just above the time bar, the time interval between consecutive times of the dataset is displayed. This time interval is the average interval between consecutive timesteps for the selected dataset. It is

calculated by dividing the range of timesteps (last time – first time) by the number of timesteps. The actual time between two consecutive data points might be different from this value.

If you are an Arc user, see the *Arc 10* section for further refinement options

Download Data

Once you have all of your refinement options set, click the “Process” button. It will open a save dialog and you can choose where to save the output.

SOS - Subset & Process

The 'Subset and Process' window for SOS shows a map with each station available from the SOS server represented by a single red dot.

Navigation

At the bottom left of the map is a navigation toolbar. This toolbar allows you to navigate around the map. You may zoom in or out and pan around the map. You can also adjust the tilt of the camera and the appearance of topography when in 3D mode.

Selecting Stations

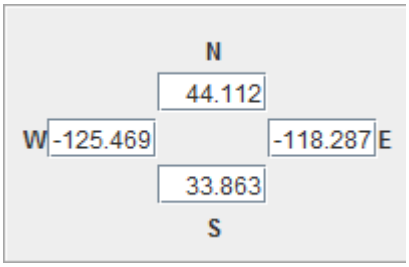
Stations can be selected in a number of ways including by drawing a bounding box, drawing a polygon, manually setting the boundaries, selecting individual stations from the map, and selecting individual stations from the list of sensors.

To draw a bounding box, click on the "Select by BBOX" button (as shown to the left). Once clicked, drawing mode is active and may click on the map and continue to hold down the mouse button while you move the mouse around.

To draw a polygon, click on the “Select by Polygon” button (as shown to the left). Once clicked, drawing mode is active and may click on the map. Each click will add a vertex to the polygon. To end the polygon, double-click while adding the last vertex.

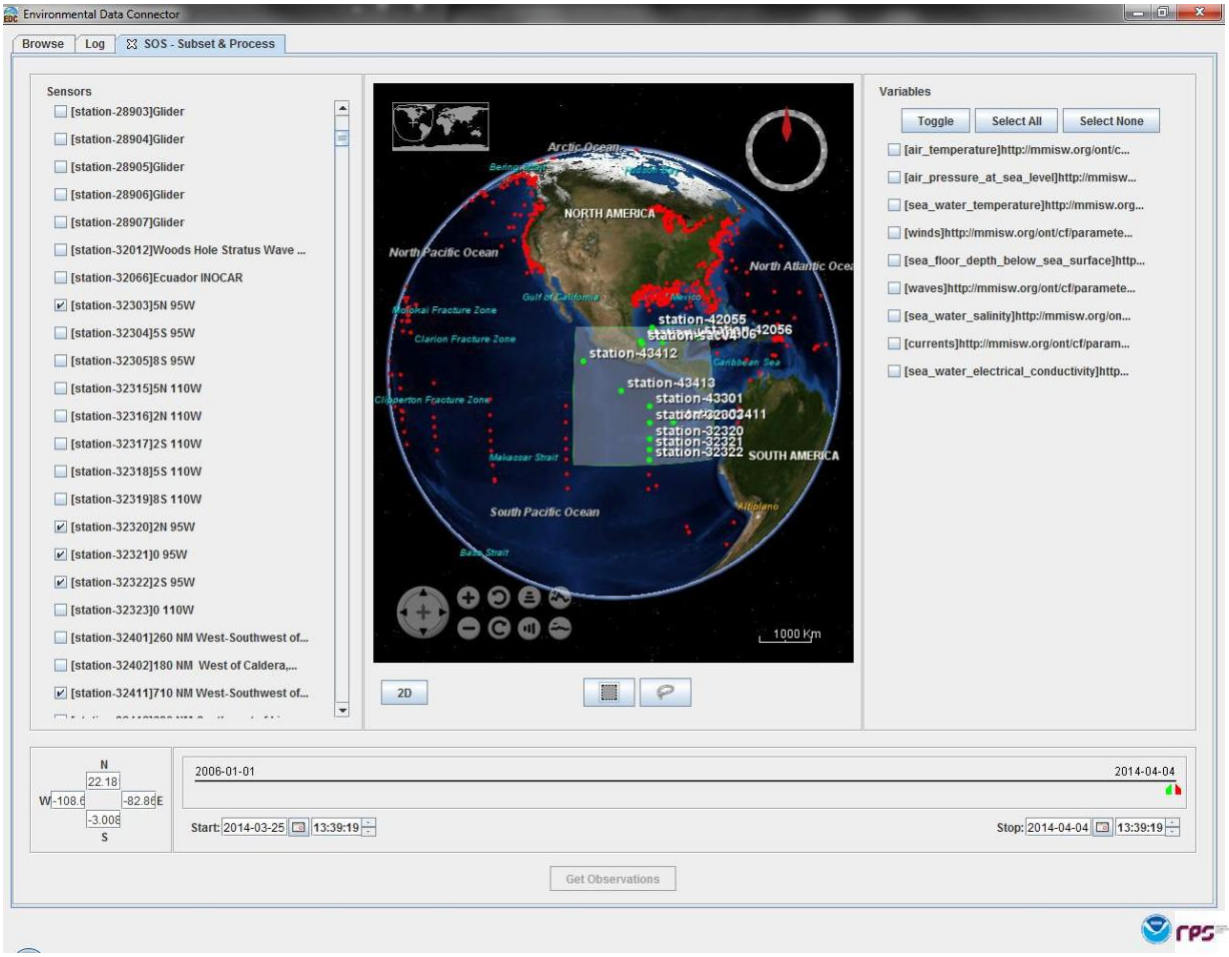
To select individual stations from the map, use the mouse to click on each station of interest. Clicking a previously selected station with unselect that station.

To manually set boundaries for an area of interest, enter the North, East, South, and West bounds into the individual input boxes.



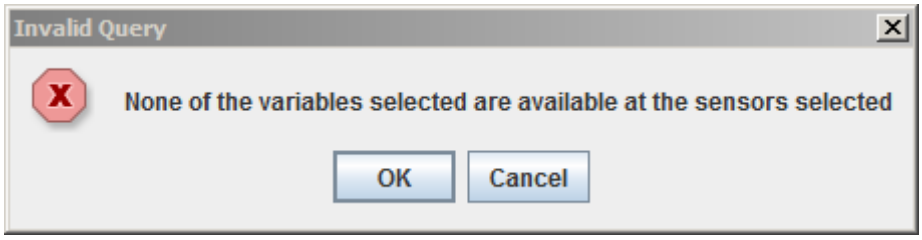
Finally, using the list of stations on the left hand side of the EDC, you can select and deselect individual stations by checking and unchecking the boxes next to the station name.

The stations which are currently selected are represented by labeled green dots on the map; they will also appear as checked in the list of sensors.



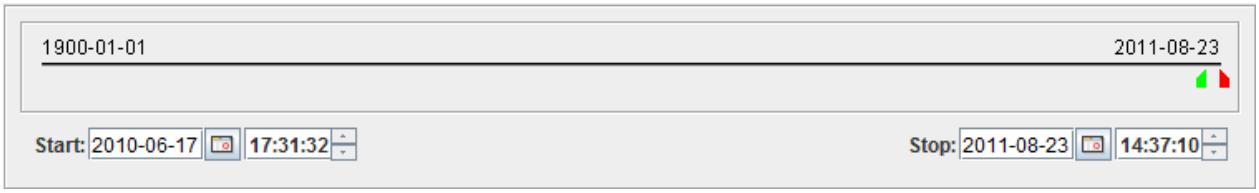
Selecting Variables

A list of all available variables on the SOS server is presented on the right side of the EDC. These represent a union of all variations available at each station. Since some variable are not available at all stations, a warning is presented if you select a range of sensors and variables that do not overlap.



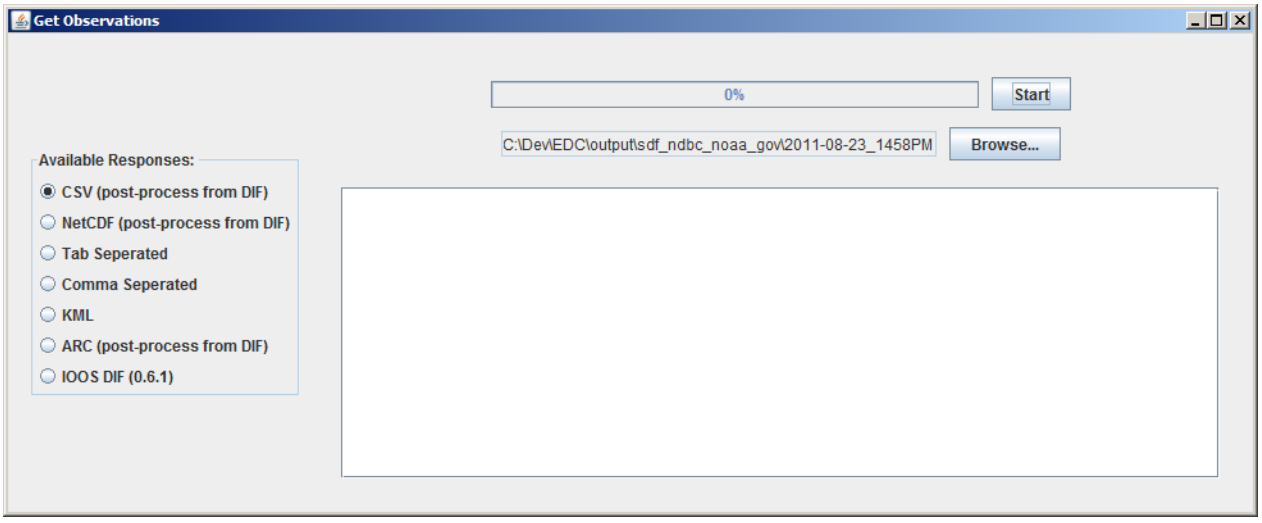
Selecting Temporal Limits

Once you have defined the sensors and variables that you wish to download, define the times of the data that you wish to download. This is done by manipulating the time bar at the bottom of the EDC. In the time bar, the green pointer represents the beginning time of the data to be downloaded, and the red pointer represents the ending time. You can also input start and end times manually.

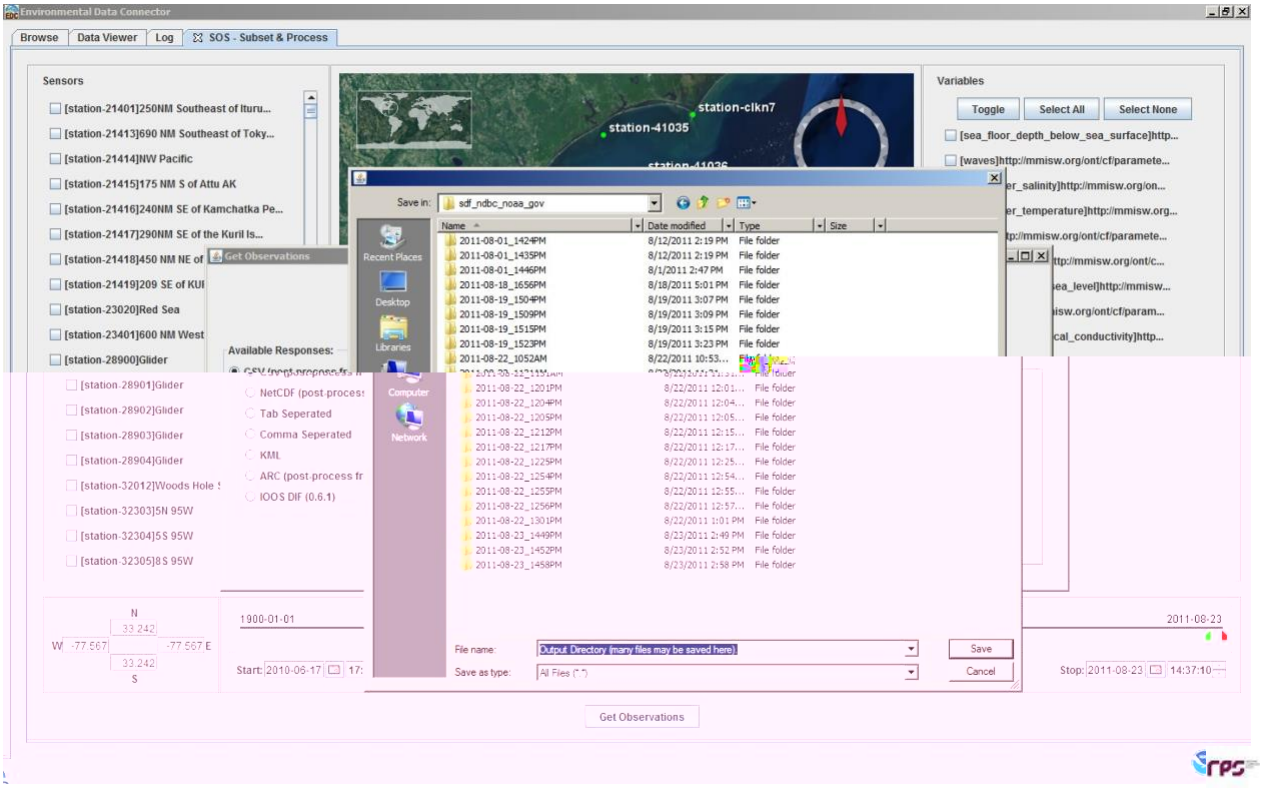


Downloading Data

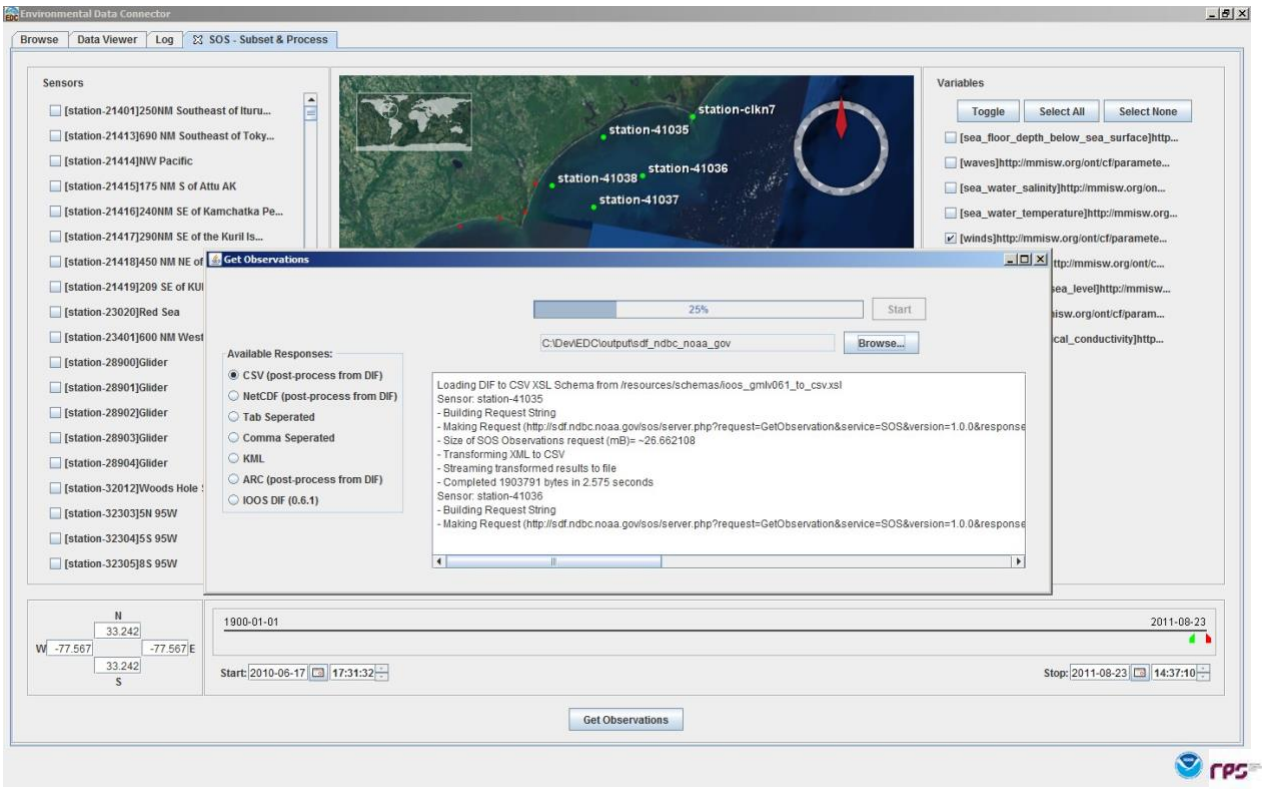
Once you have the sensors, variables, and temporal range defined, click the “Get Observations” button at the bottom of the EDC. This will bring up a dialog where you can pick the output format for the downloaded data. Different versions of the EDC will present the user with different options at this point. Some response formats are returns directly from the SOS server you are querying. Others (identified as “post-process”) are downloaded by EDC and converted to a specific format to work with applications such as ArcGIS and Matlab.



The output location for the data is shown in the text box under the status bar. To change the location, click the “Browse” button and navigate to another folder.

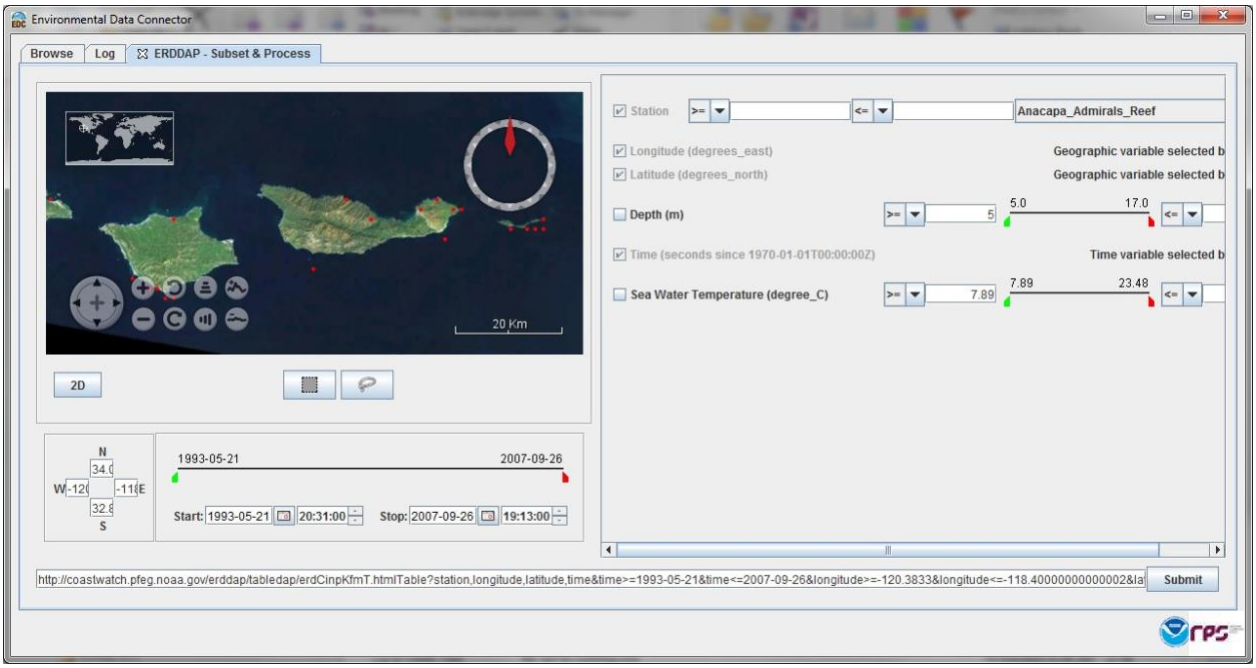


Once a path is chosen, you may click the start button to query the SOS server and download the data. The EDC will make one request per sensor and save each sensor output to a different file in the directory you have chosen.



ERDDAP – Subset & Process

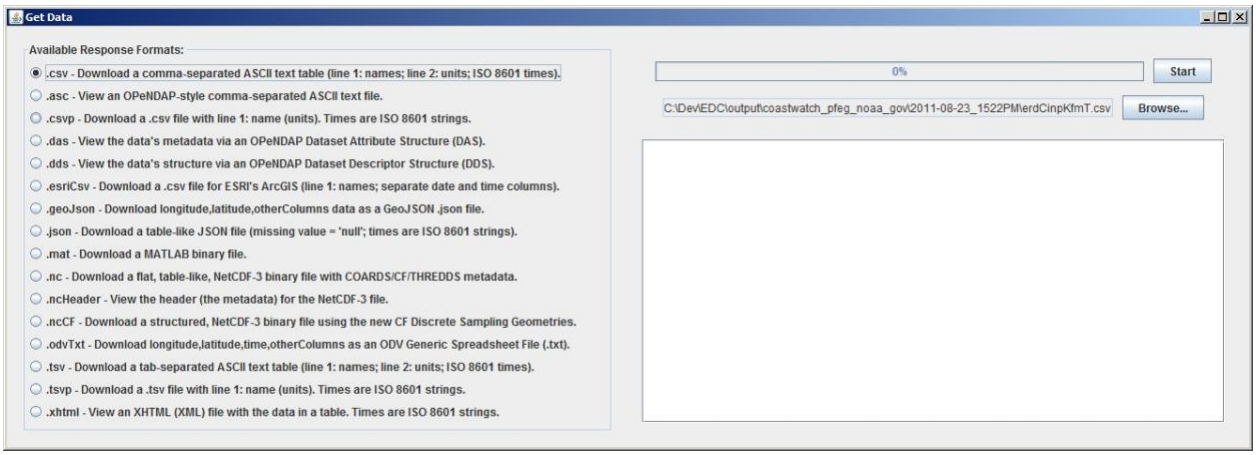
If the Tabledap dataset has spatial information associated with it, depending on the number of data points, either red dots or a red bounding box will appear on a map showing locations of the data. Not all datasets have spatial information and therefore may not show on the map.



On the right hand side of EDC, there will be a listing of variables available for the selected dataset. Spatial and temporal variables are automatically included in the output.

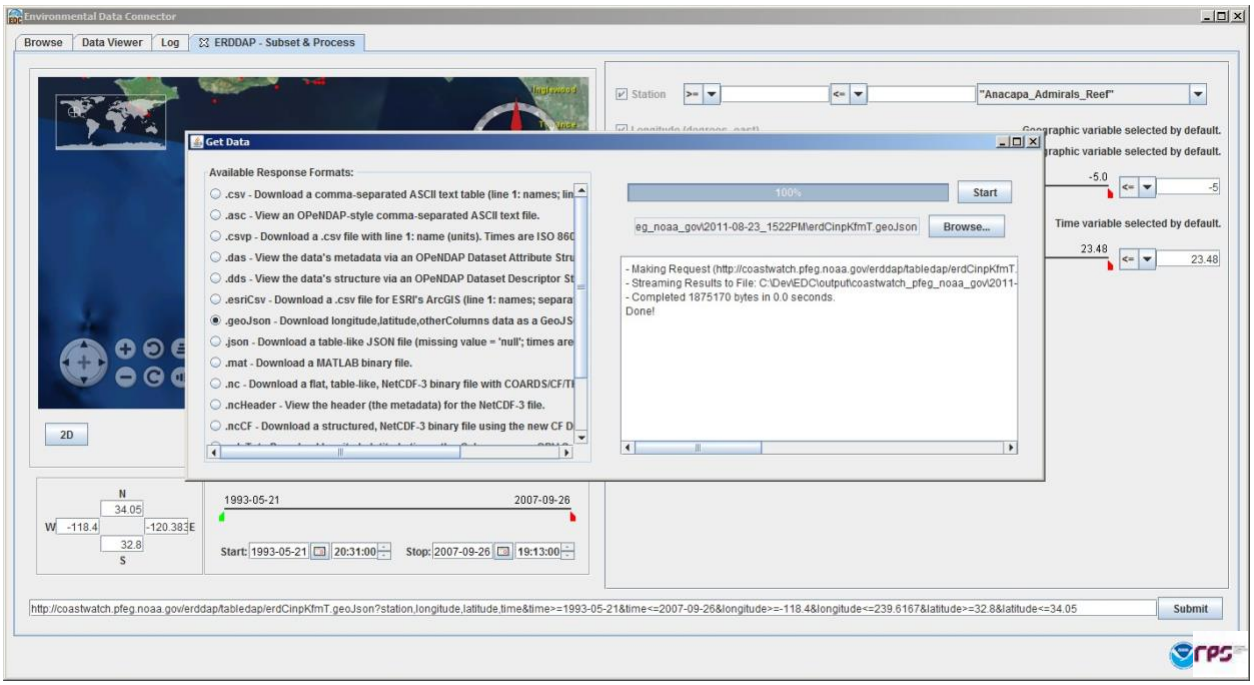
A user may select from many operators for each variable to create a subset of data for download. Putting a checkbox next to the variable name will include that variable's output in the final result as well as apply the any user constraints to the ERDDAP request. The URL that appears at the bottom contains the actual URL that EDC will use to request data from ERDDAP.

When the spatial, temporal, and variable constraints are set, press the "Submit" button at the bottom of the EDC. You will be presented with a dialog containing a list of available output types. Depending on the version of EDC you are running, the output options may vary.



Select the desired output format and click "Start" to download the data.

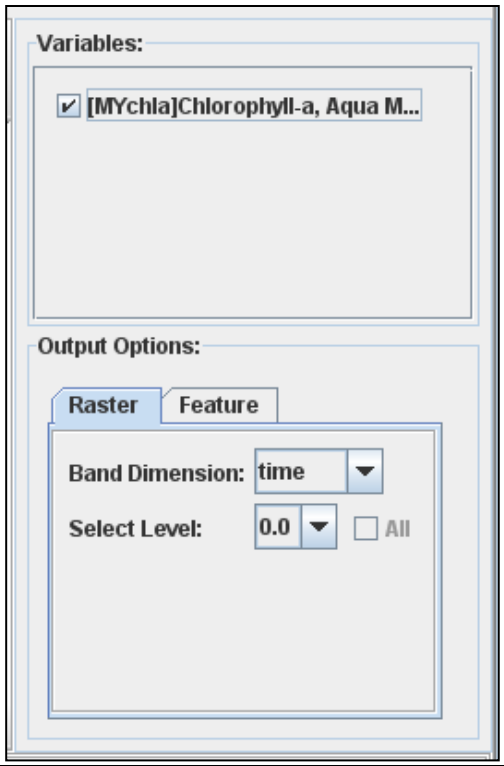
The download location that the EDC shown in the text box under the status bar. To change the location, click the "Browse" button and navigate to a different folder.


Environmental Data Connector
Browse
Data Viewer
Log
ERDDAP - Subset & Process
Station
"Anacapa_Admirals_Reef"
Get Data
Available Response Formats:
.csv - Download a comma-separated ASCII text table (line 1: names; lin
.asc - View an OPeNDAP-style comma-separated ASCII text file.
.csvp - Download a .csv file with line 1: name (units). Times are ISO 860
.das - View the data's metadata via an OPeNDAP Dataset Attribute Stru
.dds - View the data's structure via an OPeNDAP Dataset Descriptor St
.esriCsv - Download a .csv file for ESRI's ArcGIS (line 1: names; separa
.geoJson - Download longitude,latitude,otherColumns data as a GeoJS
.json - Download a table-like JSON file (missing value = 'null'; times are
.mat - Download a MATLAB binary file.
.nc - Download a flat, table-like, NetCDF-3 binary file with COARDS/CF/TI
.ncHeader - View the header (the metadata) for the NetCDF-3 file.
.ncCF - Download a structured, NetCDF-3 binary file using the new CF D
100%
Start
eg_noaa_gov\2011-08-23_1522PM\erdCinpKfmT.geoJson
Browse...
- Making Request (http://coastwatch.pfeg.noaa.gov/erddap/tabledap/erdCinpKfmT.
- Streaming Results to File: C:\Dev\EDC\output\coastwatch_pfeg_noaa_gov\2011-
- Completed 1875170 bytes in 0.0 seconds.
Done!
Geographic variable selected by default.
Time variable selected by default.
-5.0
-5
23.48
23.48
2D
N
34.05
W
-118.4
-120.383
E
32.8
S
1993-05-21
2007-09-26
Start: 1993-05-21 20:31:00
Stop: 2007-09-26 19:13:00
http://coastwatch.pfeg.noaa.gov/erddap/tabledap/erdCinpKfmT.geoJson?station,longitude,latitude,time&time>=1993-05-21&time<=2007-09-26&longitude>=-118.4&longitude<=239.6167&latitude>=32.8&latitude<=34.05
Submit

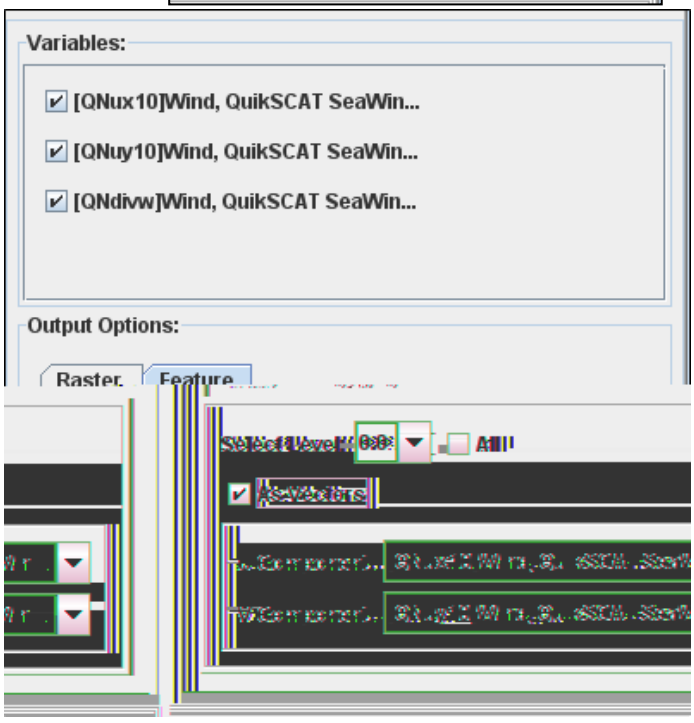
5. Working with data in ArcMap

Downloading Raster Data

If you wish to download data in raster format, then select the 'Raster' tab in the 'Output Options' window in the right hand side of the EDC. Check the box next to the variable that you would like to download. Depending on the specific dataset you are connected to, there might be more than one variable in this list. If you are downloading the data as a raster, you can only download one variable at a time.



Once you have selected the raster variable, click the 'Process' button to download the data. You will be asked to give a name for the data. It is recommended that users enter a name of their choosing rather than use the default. Once you click the 'Process' button, the EDC subsets the data on the server, only downloading the data for the time and space that you have selected. The data is initially downloaded in netCDF format. Once the download is complete, the EDC will close. The downloaded netCDF file is then converted to an ArcGIS raster using ArcGIS's conversion tools. Be patient while ArcGIS converts the file. This can often be a lengthy step and there is no progress bar to show that ArcMap is still working on the conversion.



The resulting ArcGIS layer consists of a raster catalog along with the first raster of the data set which displays a legend for the full dataset. The data dimension used as the band dimension is specified in the 'Output Options' window of the EDC. This band dimension is usually time, but can be another dimension (such as depth or height) if that dimension is available. If the dataset contains more than 3 dimensions, then you must select the value of the 4th dimension in the 'Select Level' menu. For example, if the dataset has dimensions of 'latitude', 'longitude', 'altitude', and 'time', and you select 'time' as the band dimension, then you would have to pick the altitude level of the data. Some datasets might have a 4th

dimension containing only one value (e.g. – 0 meter altitude for sea level data).

Downloading Feature Data

If your data is more suited to an ArcGIS feature layer rather than an ArcGIS raster, then you may choose to download the data as a feature dataset. Unlike a raster, a feature dataset can contain multiple data variables. A common type of feature dataset is current or wind data. These datasets consist of (at least) two variables, a u-component (zonal) and a v-component (meridional).

When downloading feature datasets, select the spatial and temporal limits of the data you wish to download. Select the 'Feature' tab in the 'Output Options' window. Select the variables you wish to import in the 'Variables' window.

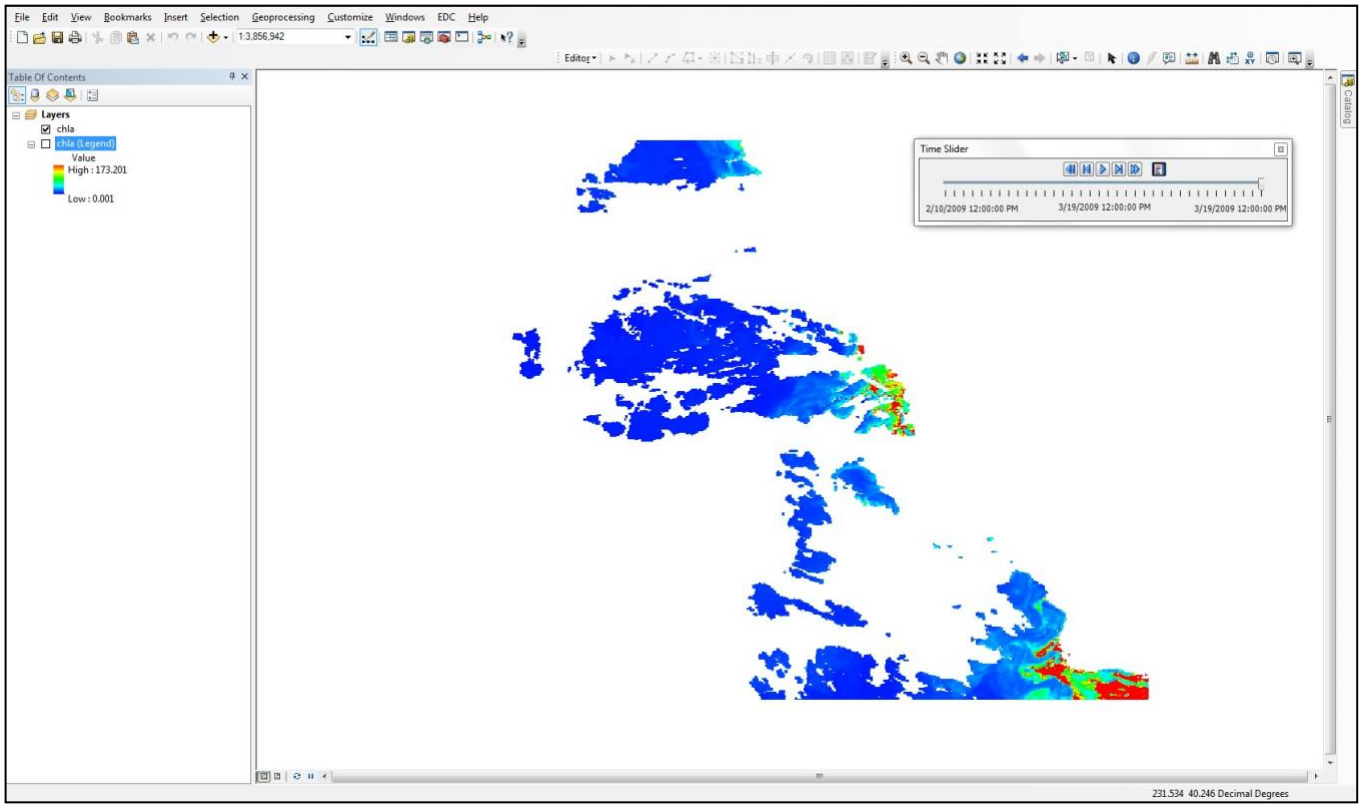
In the 'Feature' tab, select the level of the data you are downloading (see the section on 'Downloading Raster Data' for information on data levels). If the data you want to download is vector data (such as wind or current data), then select the 'As Vectors' box and select the variables which represent the u and v components of the vectors. These variables will be used to calculate the speed and direction fields needed by ArcGIS to display vectors.

Sometimes, you may want to combine variables which are present in different datasets into the same ArcGIS feature dataset. In this situation, subset and process the first dataset you want by connecting to the dataset and selecting the spatial and temporal limits. Then click the "Add Dataset" button, located above the map toolbar. Clicking this button will bring you back to the THREDDS catalog/dataset selection page. Select the second dataset you wish to add, and click "Subset and Process". Both variables will now be visible in the 'Variables' window. Repeat to add additional dataset variables. Note that in order to merge datasets, the metadata for the two datasets being merged must be exactly identical.

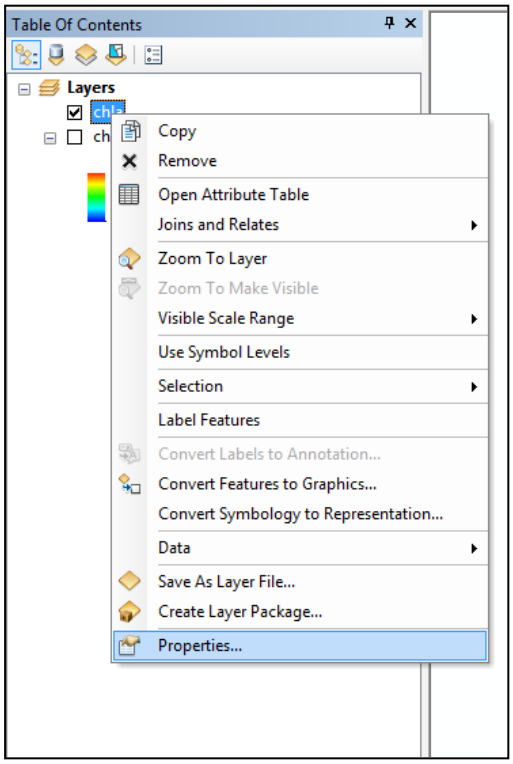
Once you have selected the spatial and temporal limits and selected all the variables you wish to include in the feature dataset, click the 'Process' button to import the data into ArcGIS. The downloading process is similar to the raster case. First, the EDC subsets and downloads the data as a netCDF file. Then, ArcGIS converts this netCDF file to a feature layer. Be patient while ArcGIS converts the netCDF!

Viewing Data in ArcMap

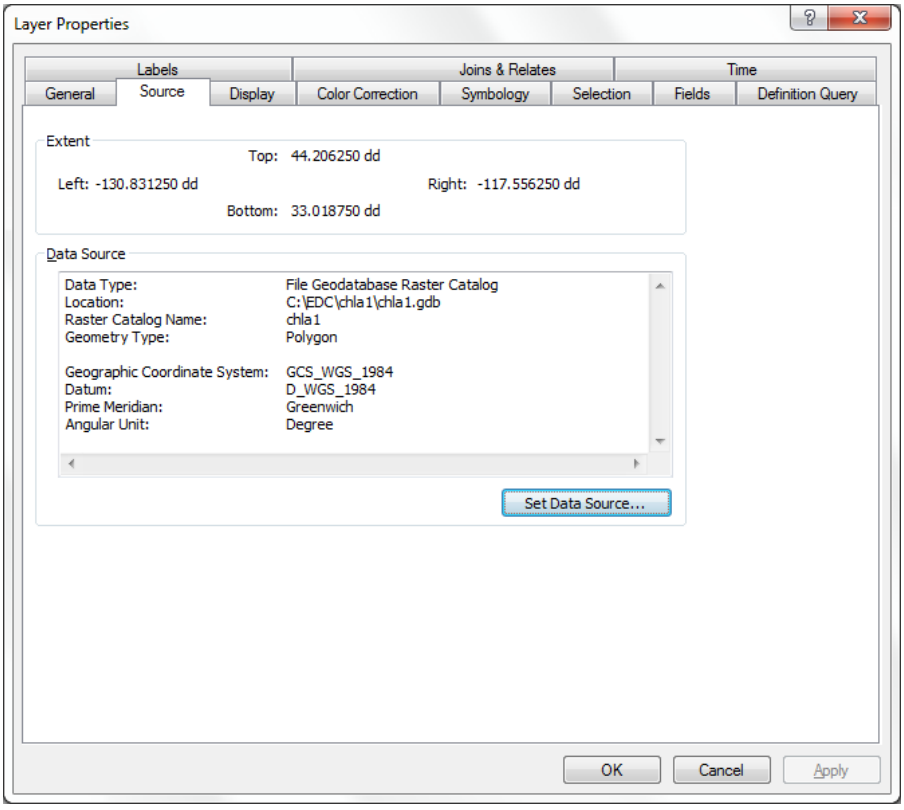
Once the data has been downloaded and converted by ArcGIS tools, it will be displayed in the current ArcMap window.



By right clicking on the dataset in the Table of Contents and selecting 'Properties', you can see the properties of the data that was just imported.



The dataset properties window for a raster datasets shows information such as the source and file location, the cellsize of the raster, and the spatial reference (all data is imported with the WGS1984 spatial reference). In the properties window, you can also change the way that the data is displayed (in the symbology tab).

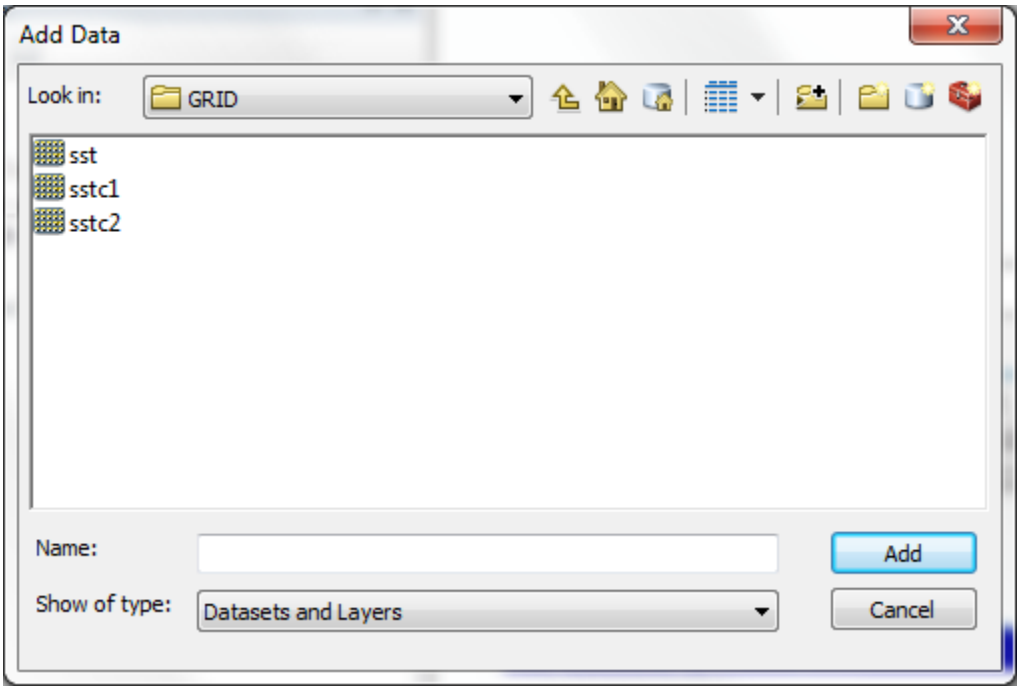


For raster data, the EDC by default sets a linear colormap using the maximum and minimum values for the entire dataset as the upper and lower limits of the colormap. When you animate through the data, the values the colormap does not change as the animation progresses. You may change the limits or the colormap in the 'Symbology' tab of the layer properties window.

Adding Previously Saved Data

At some point, you may want to add data which has been previously downloaded. For data selected using a bounding box or polygon, the EDC downloads one netCDF file (with a .nc file extension) and saves this file to a local data directory (the location of this directory can be changed in the file, edcconfig.xml). If this file is an **ArcGIS raster**, the netCDF file then converts this file into a ArcGIS raster catalog. The raster catalog is named according to the name that you chose when you downloaded the data (e.g., 'sst'). Also saved within a subfolder titled 'GRID' is a multiband raster named the same as the raster catalog along with each individual raster named similarly to the raster catalog with the suffix 'c1', 'c2', 'c3'…. These suffixes correspond to the first, second, and third rasters in the raster catalog, respectively. For example, if you had downloaded a data file and called it 'sst', you would have a local directory called 'sst'. In this directory, there would be a netCDF file called 'sst.nc'. Along with an ArcGIS raster catalog called 'sst.gdb', and several files in the folder 'GRID' called 'sst', 'sstc1', 'sstc2', etc.

To import this data into ArcGIS manually, simply add the raster catalog to ArcMap with the 'Add Data' button (or click the 'File' menu and choose 'Add Data'). If you wish to import the individual rasters separately (useful if you plan on doing analysis with those rasters), then import each individual raster with the 'Add Data' button.



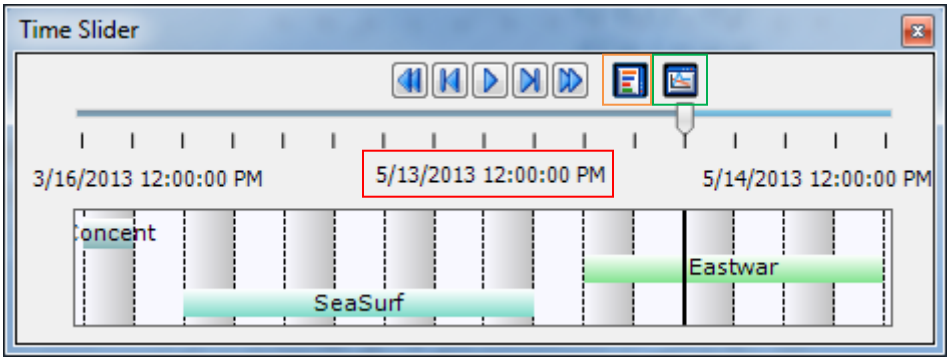
You may also add **feature layer** data that was downloaded with the EDC. The netCDF file downloaded by the EDC is saved in a folder with the same name as the dataset. This netCDF file is then converted into a feature class which is stored in a file geodatabase with the same name as the dataset. For example, if you downloaded a vector dataset consisting of variables "x" and "y" and called it "wind", then the EDC will create a local directory called "wind". Inside this directory will be the netCDF file called "wind.nc". There will also be a file geodatabase called "wind.mdb". Inside this file geodatabase, there will be a feature class called 'wind'.

For a data selected using a trackline, the EDC downloads multiple netCDF files, one for each point on the track line. The netCDF files will be numbered according to their corresponding track point. Raster GRID files will also be numbered the same way. All rasters are still combined into one raster catalog. Feature data is all combined into one file geodatabase feature class.

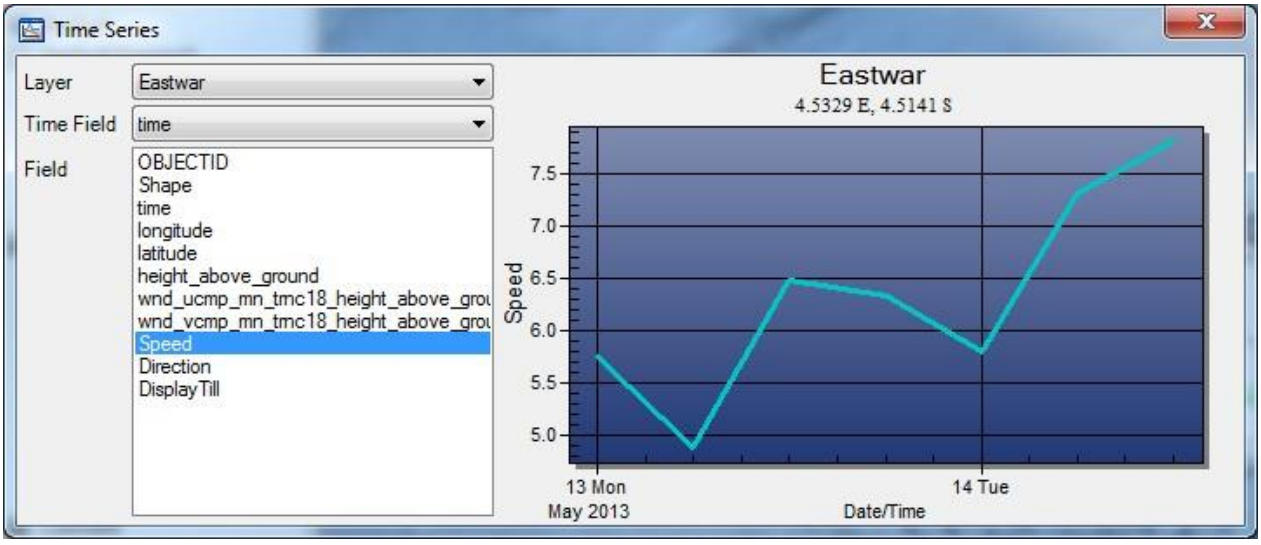
Animating Data in ArcGIS

Once you import the data into ArcGIS using the EDC, the ASA TimeSlider will appear. The different time steps that were imported are indicated by tick marks on the TimeSlider toolbar at the bottom of the screen. You may slide the time marker around manually to change the displayed time, or you may use the TimeSlider tools to animate the data. The tools allow you to step through the time steps forward or backward in time, or to animate through the data forward to backward in time. The current time being displayed is shown in center (outlined below in red).

The ASA TimeSlider has two unique features, a Gantt Chart and a Time Series tool. The Gantr Chart displays the time frame a dataset spans. To display the Gant Chart click the icon (outlined in orange below).



The Time Series tool creates time series graphs of feature data. Simply click on the time series icon (outlined in green above) and then click on a data point. Select the (feature) layer of interest from the *Layer* drop down menu, the time field from the *Time Field* dropdown, and the data field from the list of attribute fields. The graph on the right side of the dialog will automatically be populated with a time series graph of the selected variable.



New to ArcGIS 10 is a built in version of the Time Slider. When adding previously saved data it is easiest to use the Arc Time Slider. Click this icon  in the ARC toolbar to open the Arc Time Slider. The Arc Time Slider is very customizable. See the link below for information on its use:
http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//00qp00000018000000.htm

6. Configuring the EDC

Certain parts of the EDC may be configured according to the user's preference. These parameters are contained in the 'edcconfig.xml' file, which is contained in the root of the EDC install. Open this file in a text editor to change these parameters (WordPad in MS Windows is a good text editor).

Each parameter is contained in a text block. Each text block contains information about the parameter the values the parameter can take on. For example, the text block for the parameter 'CLOSE_AFTER_PROCESSING' looks like:

<!--CLOSE_AFTER_PROCESSING: MUST BE A BOOLEAN VALUE.
If true, the application will close after processing a dataset.
If false, the application will remain open until it is closed manually.
-->
<CLOSE_AFTER_PROCESSING>*true*</CLOSE_AFTER_PROCESSING>

This parameter must be a Boolean value ('true' or 'false'). To edit this parameter, change the text between the <CLOSE_AFTER_PROCESSING> tags (shown in italics) to read either 'true' or 'false'.

Some important parameters that you might need to edit are: (not an exhaustive list)

DISPLAY_TYPE: Changes the look and processing steps of the EDC. The "General" (0) display type is the most simple, and is best suited to running the EDC in standalone mode. In this display type, the EDC only downloads Grid data in netCDF format. No additional processing is done. The "ESRI" (1) display type is most suited to using the EDC is conjunction with ArcGIS. In this display type, the EDC will download data and then convert the data to ArcGIS format.

CLOSE_AFTER_PROCESSING: Must be true when using the EDC with ArcGIS. If this value is not true, then the EDC will remain open after downloading data and ArcGIS will not convert and import the downloaded files. If running the EDC in standalone mode, then this can be set to false in order to download multiple files in one EDC session.

OUTPUT_LOCATION: A string value indicating the directory location of all downloaded data. If this field is empty, then all data will be placed in the EDC/output.

ALLOW_FILE_REPLACEMENT: If true, then the user can overwrite existing files. If false, then the EDC will not allow file overwriting. Note that if the 'DISPLAY_TYPE' field is set to ESRI, then this value will always be false. Because of the file access restrictions that ESRI places on certain files, the EDC cannot overwrite files once they have been opened in ArcMap, even if the file is no longer in use.

USE_VARIABLE_NAME_FOR_OUTPUT: This controls the default name EDC gives to data. If this is true, then the name of the first variable selected will be used as the default output name. If this is false, then the description (the 'long_name') will be used as the default. The long name is a more descriptive name for the dataset, but sometimes is too long to be used as a file name in ArcGIS.

HEAP_SIZE: The amount of memory (in megabytes) allocated for the EDC to run. This is approximately equal to the maximum amount of data which can be downloaded. Note that there is currently no way

to tell whether you will exceed this limit before you begin downloading data. You may change this value to be as large as you wish, but download times may become *very* long.

7. Troubleshooting

Problem	Solution
EDC Menu doesn't appear in ArcGIS	Make sure all the required software is downloaded then restart your computer
	Software might not have registered correctly. To manually register the software drag and drop the file **EDC\System\EDC10.dll** onto **C:\Program files(x86)\Common Files\ArcGIS\bin\ESRIRegAsm.exe** (path may be different on some computers)
Desired data not displayed in EDC window	Make sure you are connected to the proper catalog. For CoastWatch data connect to: http://oceanwatch.pfeg.noaa.gov/thredds/catalog.xml
After selecting a data set and determining the spatial and temporal extent, the '**Process'** button can't be selected	Under the **variables** tab, on the right side of the EDC window, click the box next to the data you wish to download