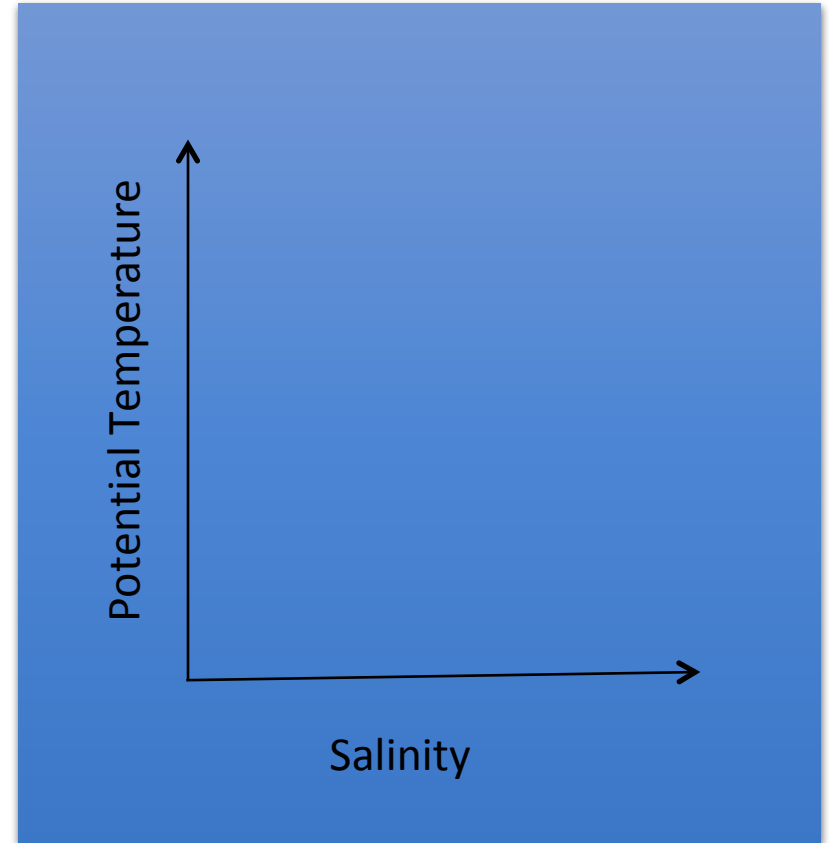
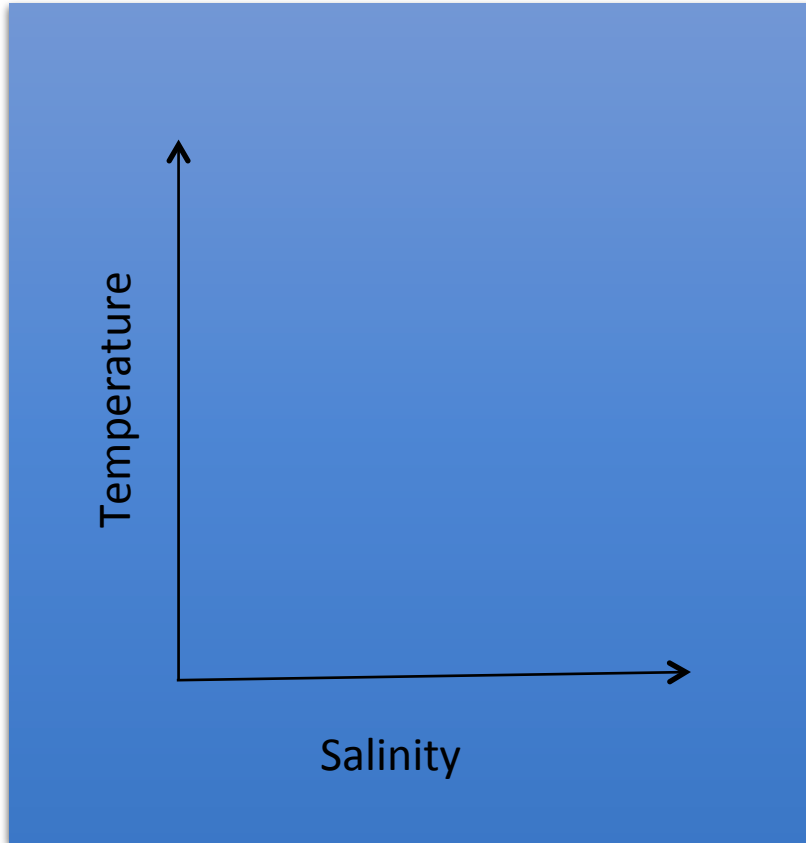
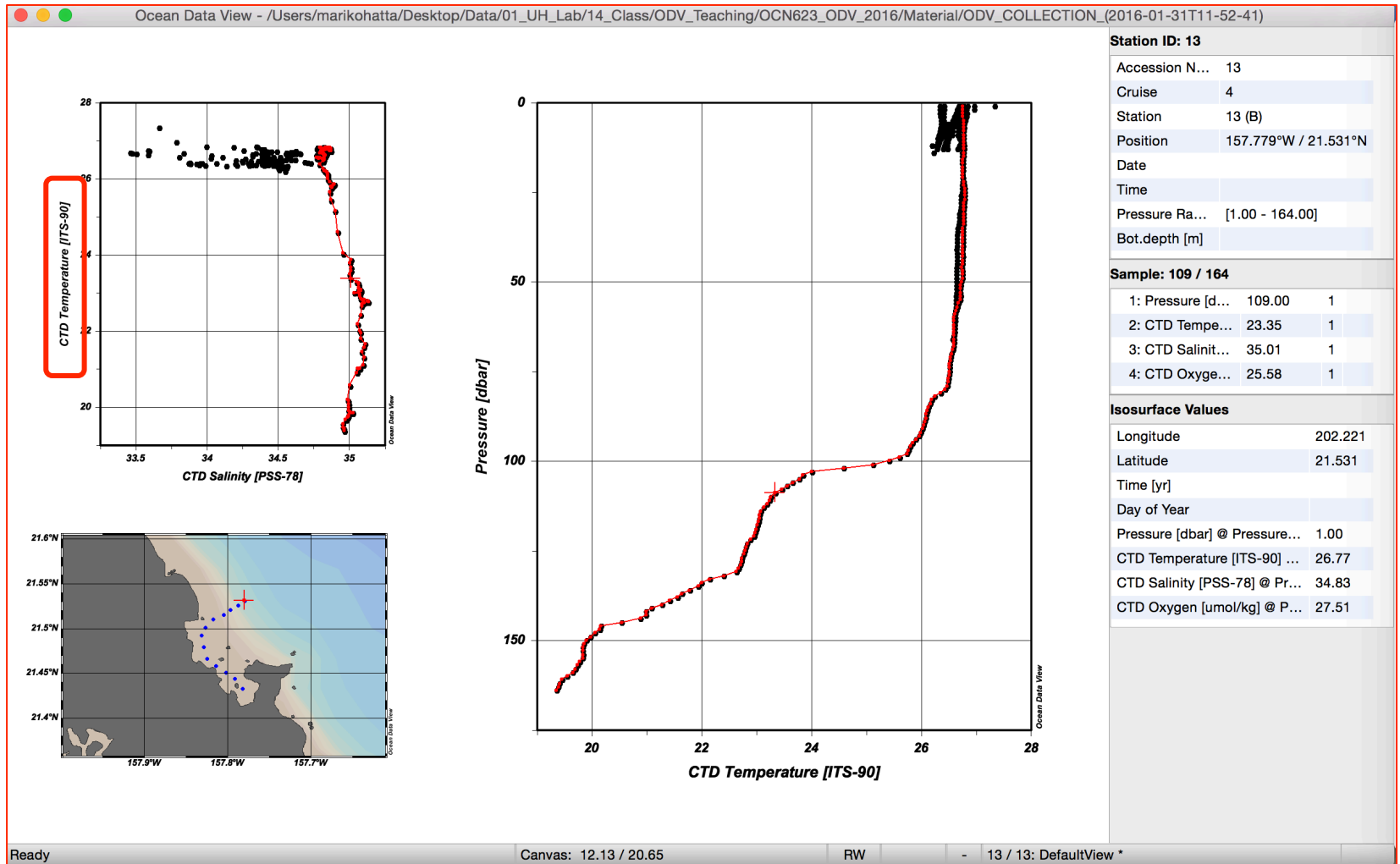


Exercise 3.

Make a T-S diagram



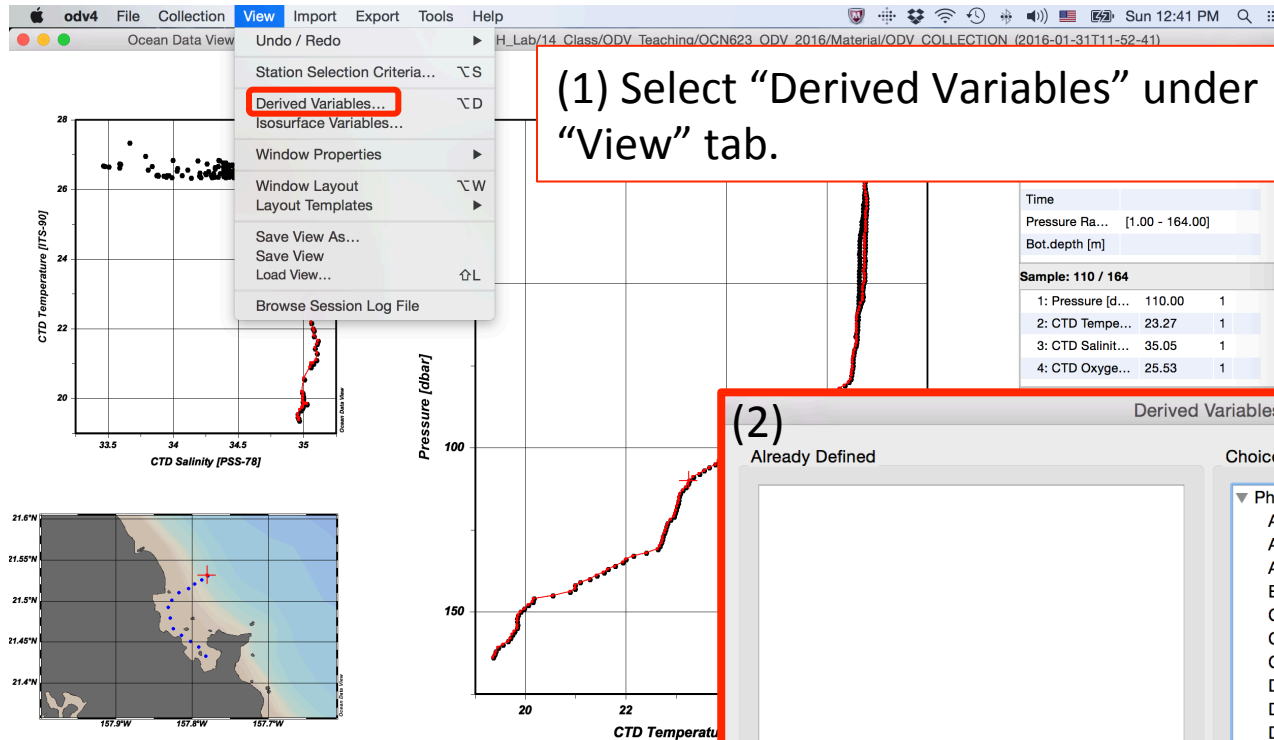
1. Change the y-axis from Pressure to CTD Temperature



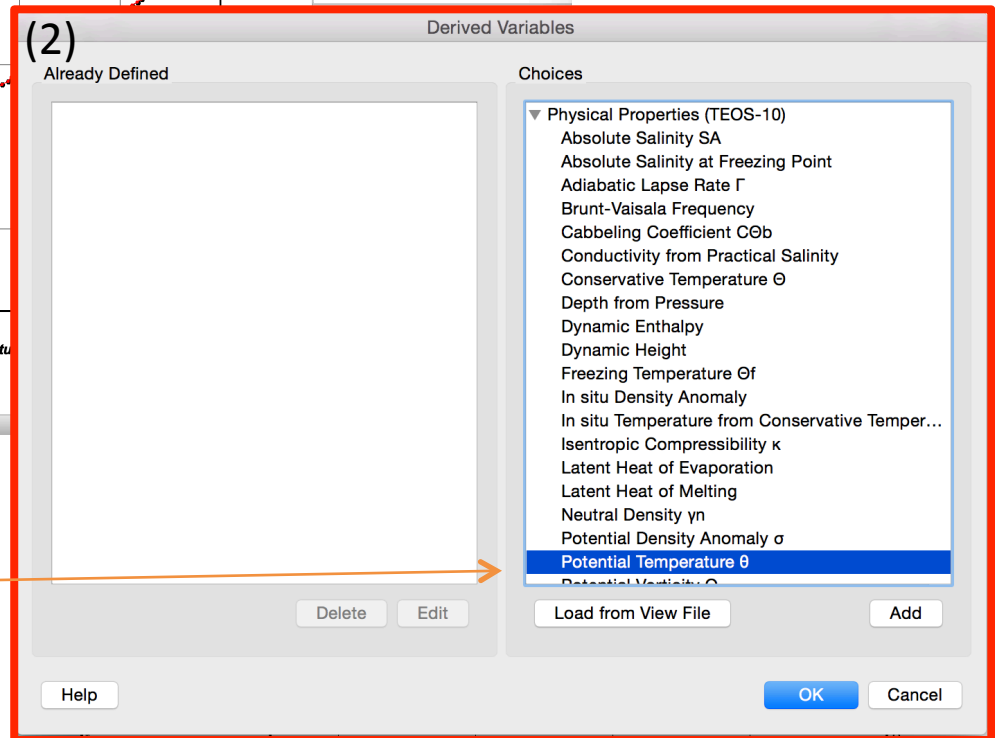
Right click, then select “Properties”, then select “Data” tab. Select “y-axis” (now selected “2:CTD Temperature [ITS-90] ”).

2. Let's make a potential temperature-salinity diagram. In order to calculate "potential Temperature" using ODV "Derived Variables" function!

(1)



(2) Select "Potential Temperature" under "Physical Properties".



3. Identify each parameter from the list. At first, you have to identify “Depth in Water Column (m)”, here is “1. Pressure”. Next, identify “Temperature”, so select “CTD Temperature”, and finally identify “Practical Salinity”, and select “CTD salinity”. Then enter “reference pressure”, so type “0”.

(1)

Potential Temperature θ

Identify: Depth in Water Column [m]

- 1: Pressure [dbar]
- 2: CTD Temperature [ITS-90]
- 3: CTD Salinity [PSS-78]
- 4: CTD Oxygen [umol/kg]

Not Available OK Cancel

(2)

Potential Temperature θ

Identify: Temperature [degC]

- 1: Pressure [dbar]
- 2: CTD Temperature [ITS-90]
- 3: CTD Salinity [PSS-78]
- 4: CTD Oxygen [umol/kg]

Not Available OK Cancel

(3)

Potential Temperature θ

Identify: Practical Salinity [psu]

- 1: Pressure [dbar]
- 2: CTD Temperature [ITS-90]
- 3: CTD Salinity [PSS-78]
- 4: CTD Oxygen [umol/kg]

Not Available OK Cancel

(4)

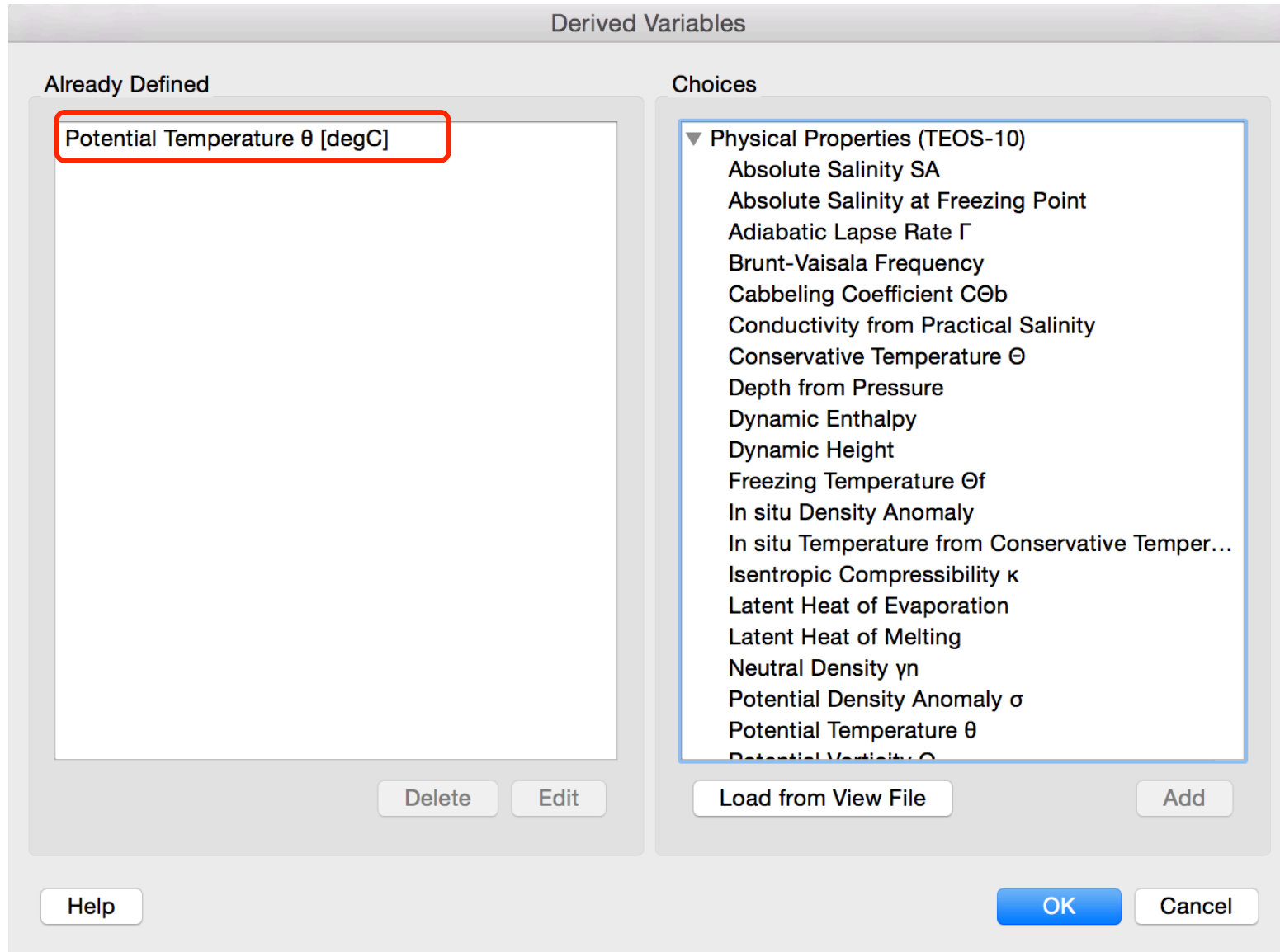
Potential Temperat...

Enter reference pressure [db]:

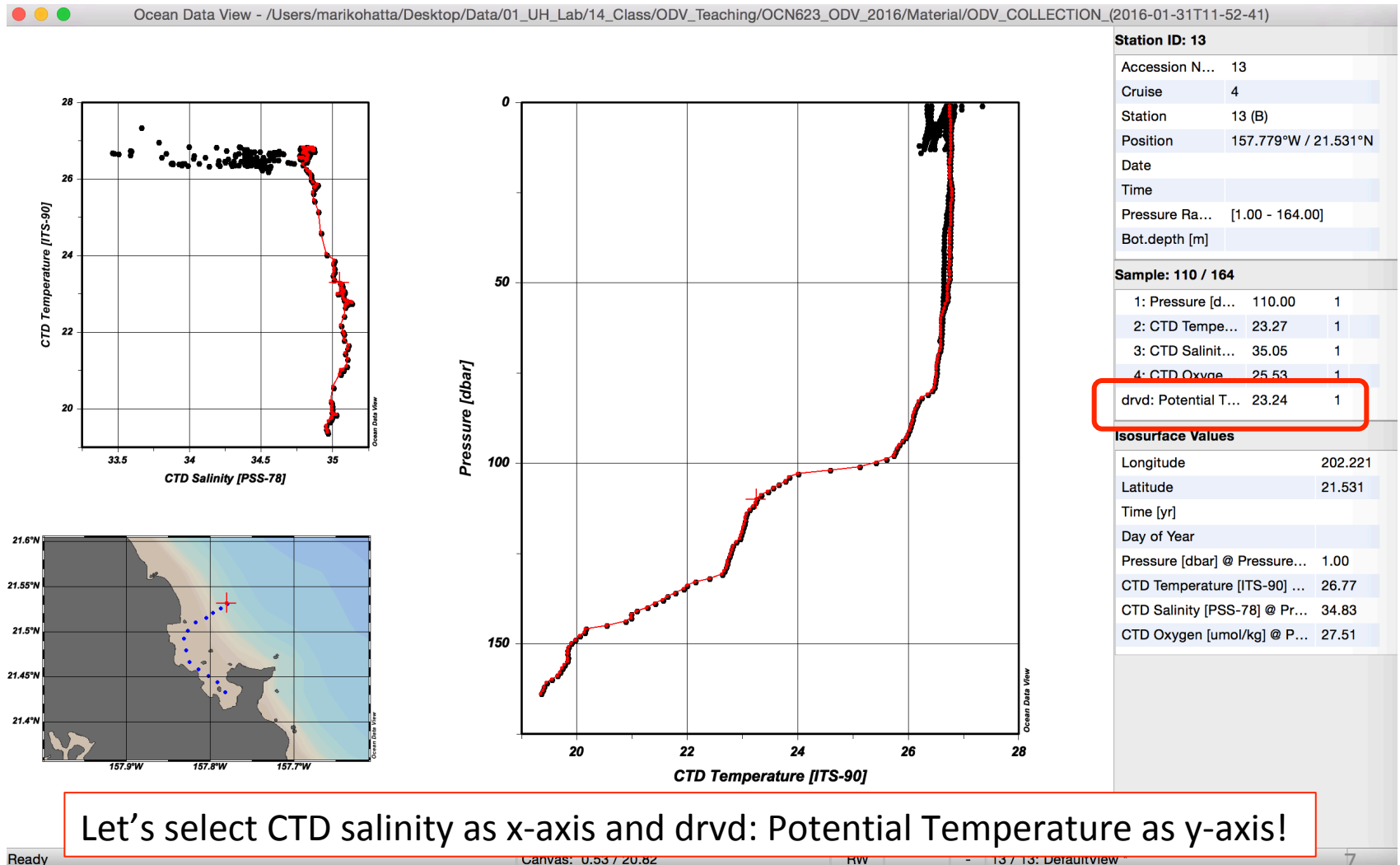
0

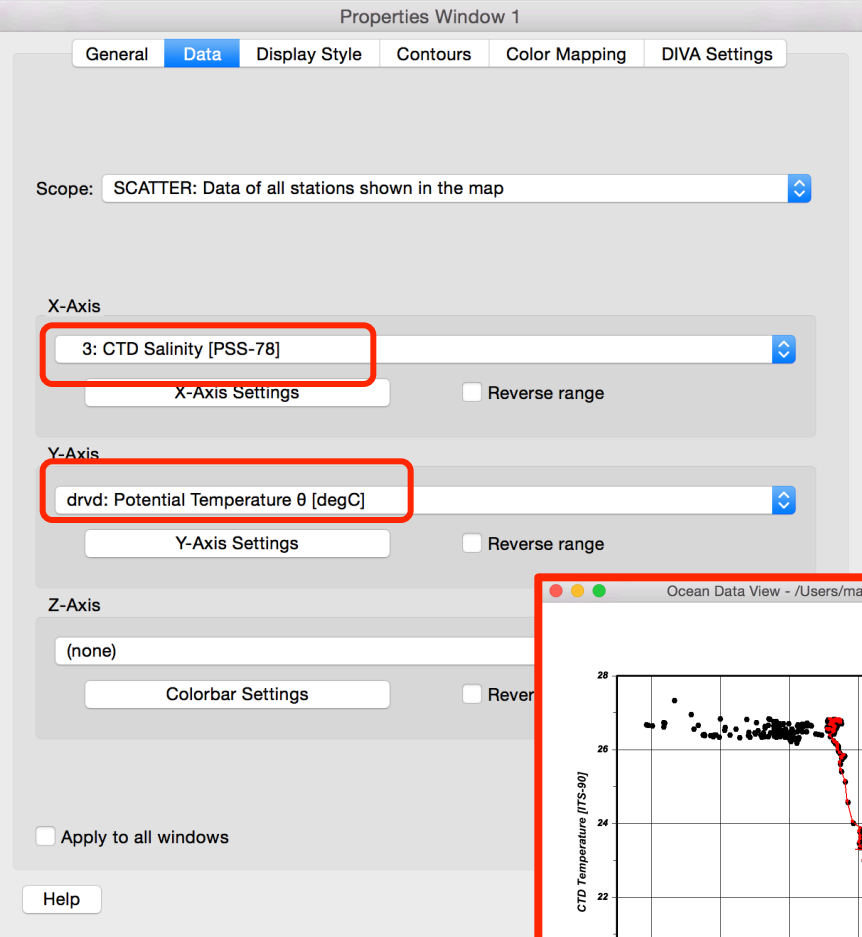
Cancel OK

4. You calculated “Potential Temperature”!

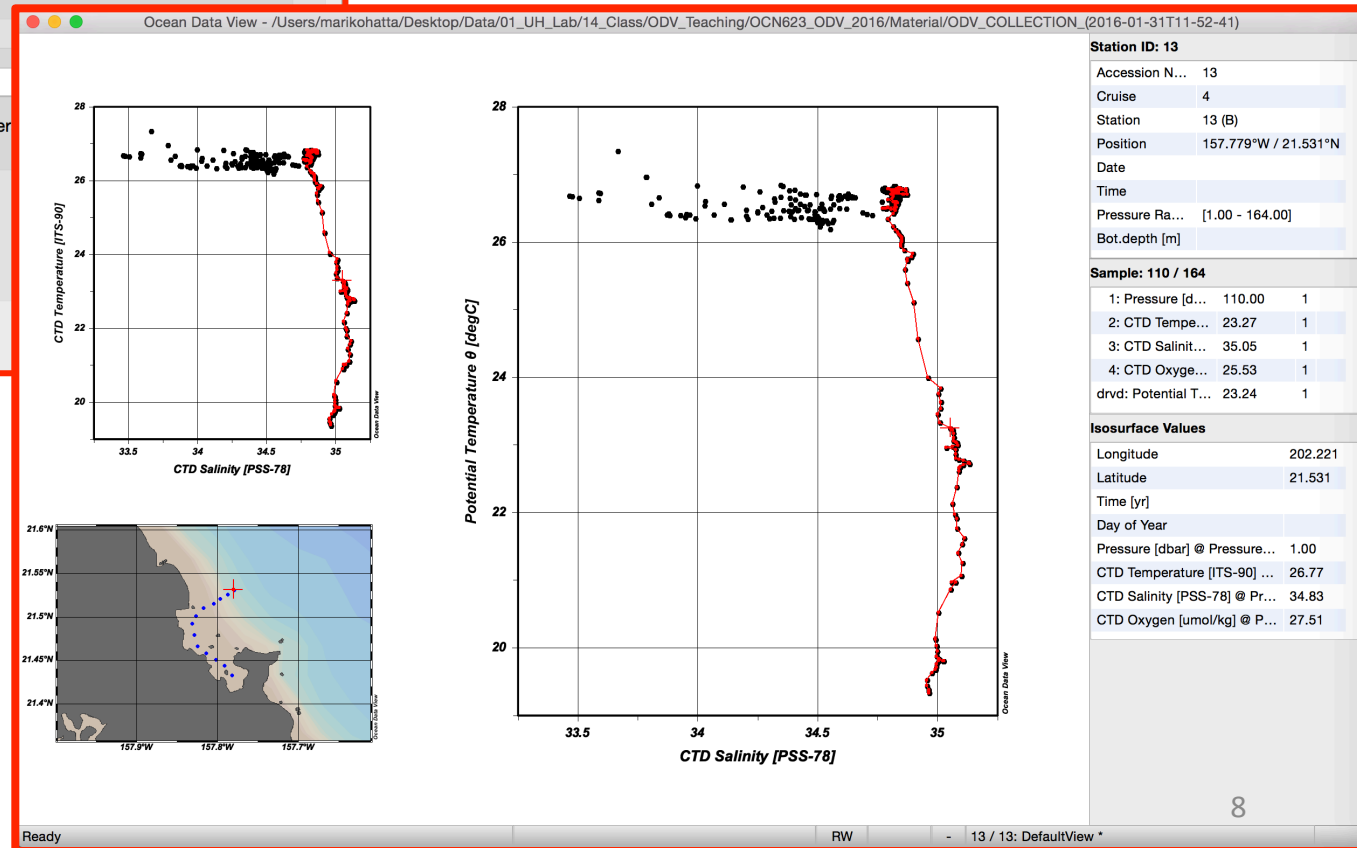


Now, “drvd: Potential Temperature” are appeared in the variables window!

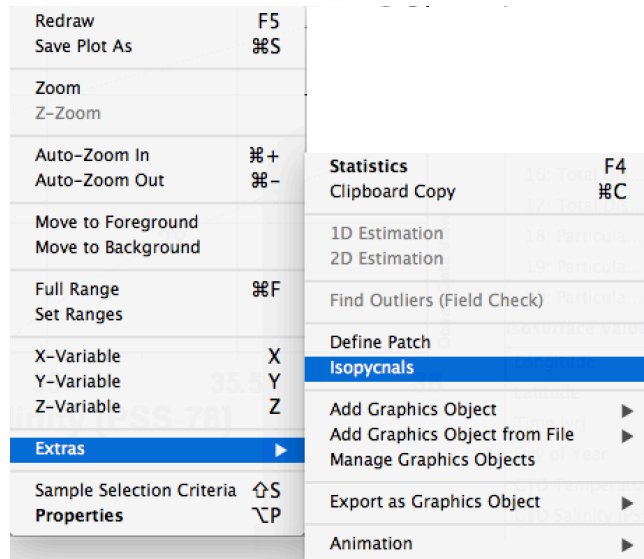




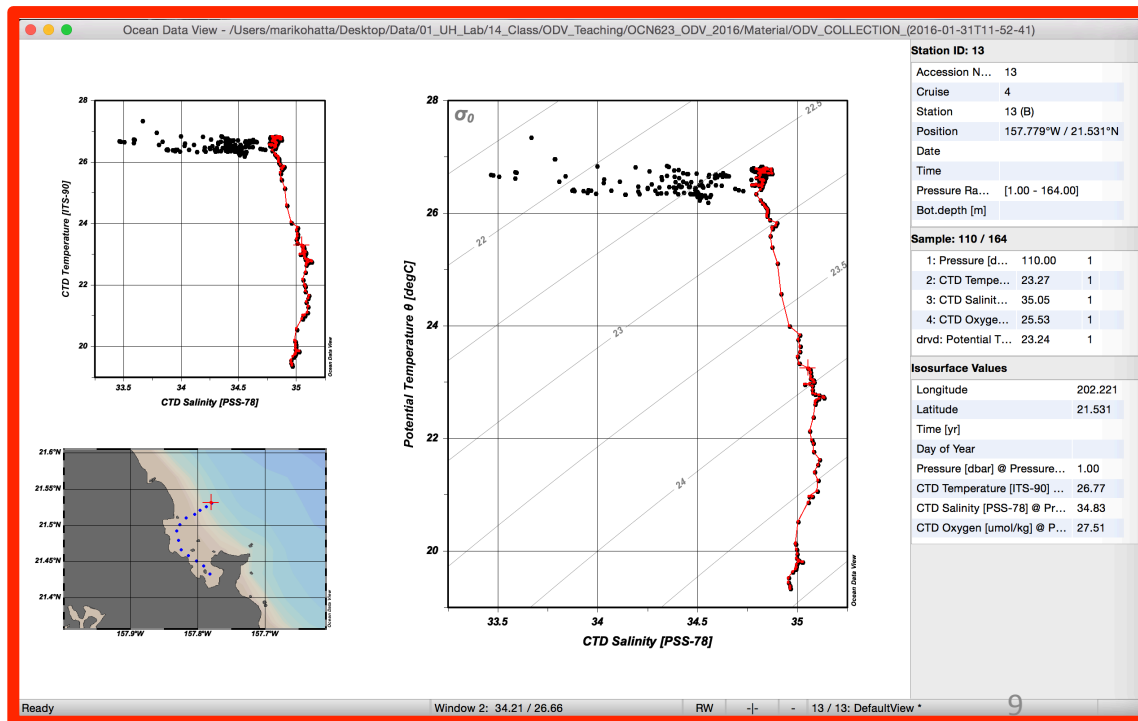
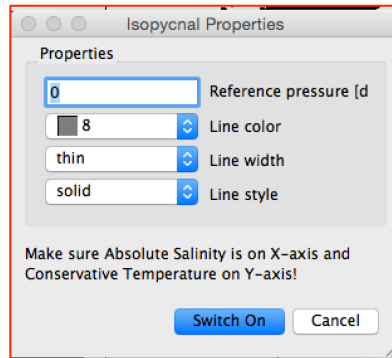
- Right click over the Window, then select Properties. Then Select “Data” tab. And Select X-axis as “3: CTD salinity” and Y-axis as “drvd: Potential Temperature”.

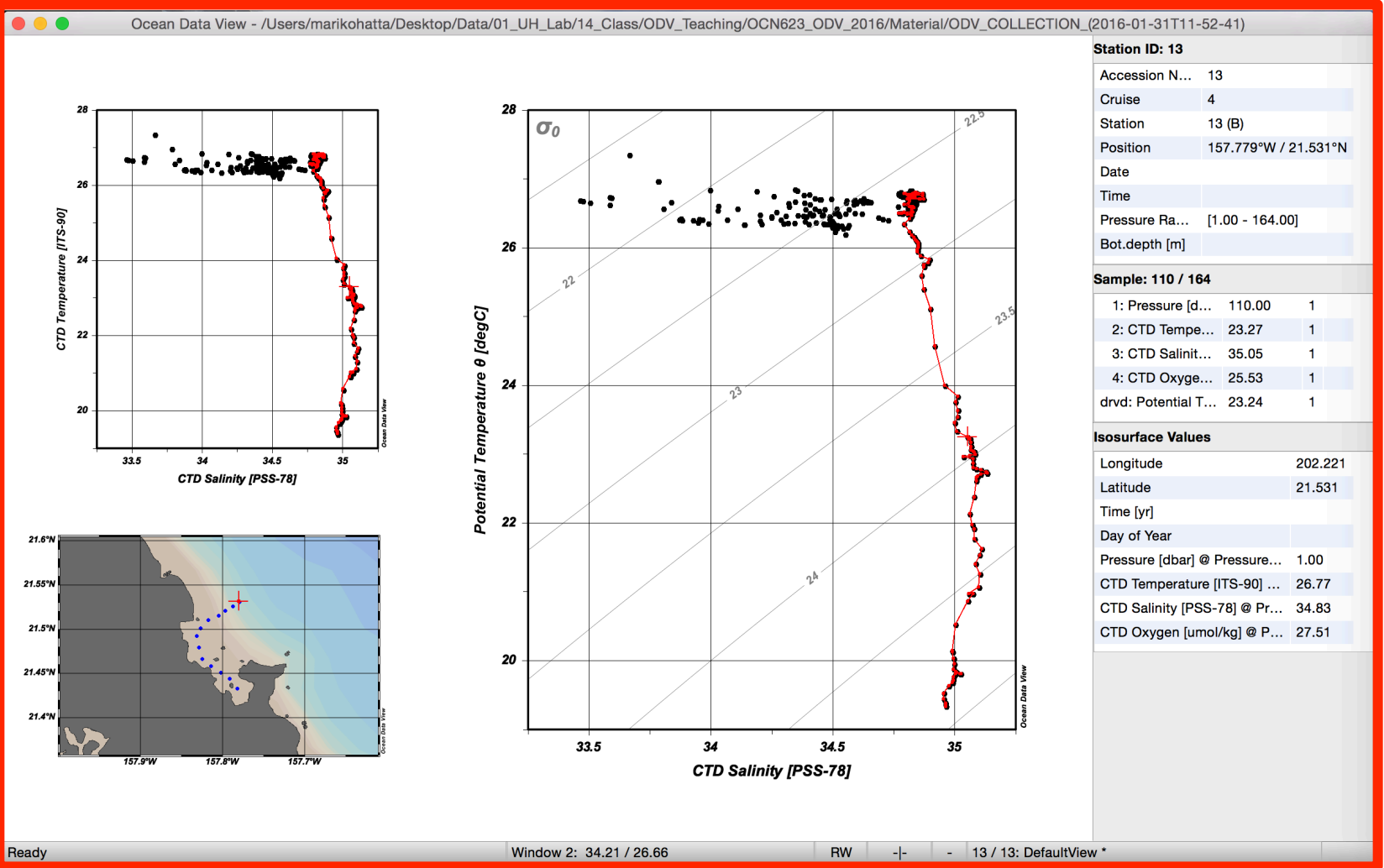


6. Draw the Isopycnals.



Right click over the Window, then select “Extras”. Then Select “Isopycnals”. Select “Switch On”.

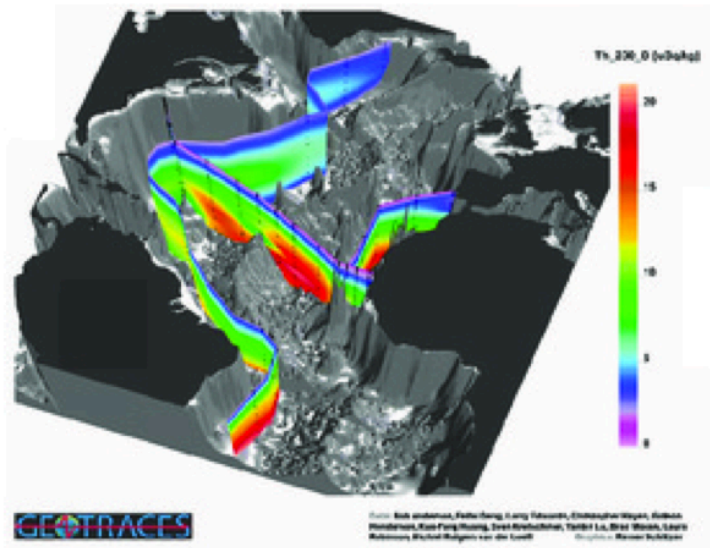




What can you do with ODV?



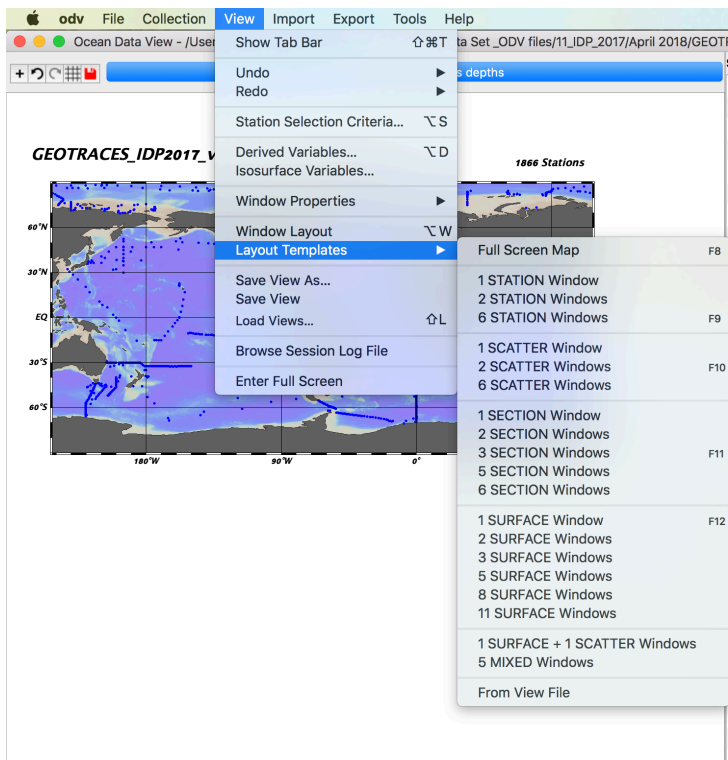
3D scene generated by Ocean Data View and Ocean 3D showing distribution of dissolved ^{230}Th in the North Atlantic



Distribution de ^{230}Th dissous dans l'Atlantique Nord : scène tridimensionnelle générée par le logiciel Ocean Data View et Ocean 3D

“ODV lets the users maintain and analyse very large datasets on inexpensive and portable hardware.

Various types of graphics output can be produced easily, including high-quality station maps, general property-property plots of one or more stations, scatter plots of selected stations, section plots along arbitrary cruise tracks and property distributions on general isosurfaces.”



Full Screen Map

F8

1 STATION Window
2 STATION Windows
6 STATION Windows

F9

1 SCATTER Window
2 SCATTER Windows
6 SCATTER Windows

F10

1 SECTION Window
2 SECTION Windows
3 SECTION Windows
5 SECTION Windows
6 SECTION Windows

F11

1 SURFACE Window
2 SURFACE Windows
3 SURFACE Windows
5 SURFACE Windows
8 SURFACE Windows
11 SURFACE Windows

F12

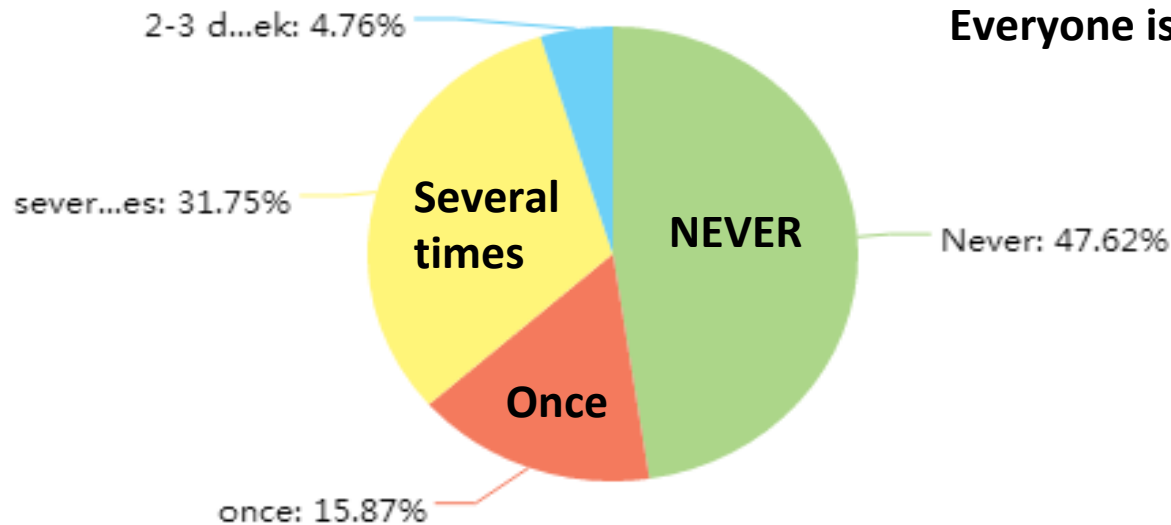
1 SURFACE + 1 SCATTER Windows
5 MIXED Windows

From View File

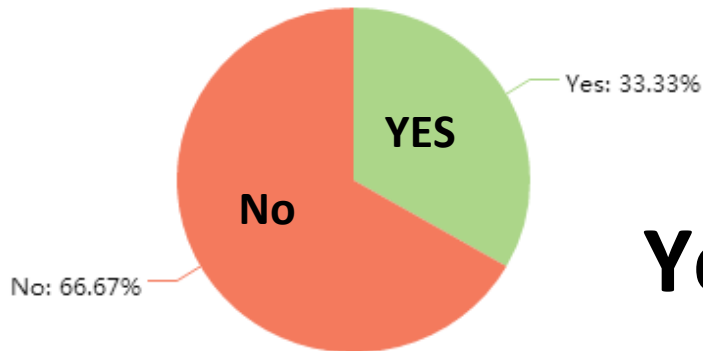
Various data format

- The ODV data format allows dense storage and very fast data access. Large data collections with millions of stations can easily be maintained and explored on inexpensive desktop and notebook computers. Data from [Argo](#), [GTSP](#), [CCHDO](#), [World Ocean Database](#), [World Ocean Atlas](#), [World Ocean Circulation Experiment \(WOCE\)](#), [SeaDataNet](#), and [Medar/Medatlas](#) can be directly imported into ODV. Ready-to-use versions of the WOCE data, the gridded World Ocean Atlas 2009, 2005 and 2001 as well as many other important geoscience datasets are available for [download](#).
- ODV also supports the [netCDF](#) format and lets you explore and visualize [CF](#), [COARDS](#), [GDT](#) and [CDC compliant](#) netCDF data sets. This works with netCDF files on your local machine as well as with remote netCDF files served by an OPeNDAP server. Climate data in netCDF format are available [here](#).

Have you ever used ODV software before?

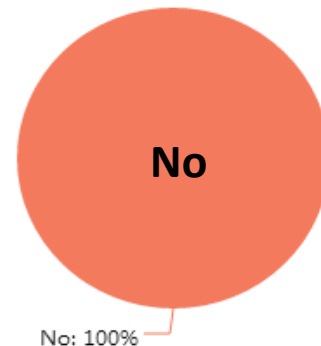


Have you ever created own data spreadsheet for ODV and import into ODV?



Yes!

Have you ever imported netCDF format data file into ODV?



ADCP data during HOT cruise

<http://currents.soest.hawaii.edu/hot/>

[Back to currents](#)

Station Aloha Shipboard ADCP data

The [Hawaii Ocean Timeseries](#) project involves cruises to [ALOHA Station](#) nearly every month, starting in October 1988. Most of these cruises have been on ships equipped with acoustic Doppler current profilers, the observations from which are presented here. Continuous time series of currents at ALOHA are available elsewhere from the [WHOTS mooring](#).

Funding from the National Science Foundation via grants OCE-0752606 and OCE-0926766 is gratefully acknowledged.

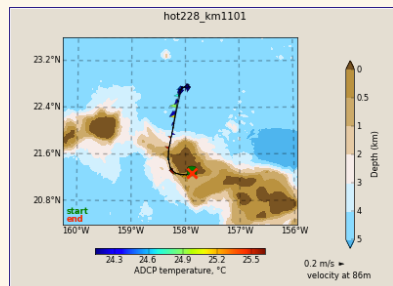
For each cruise we provide a set of links to data plots (left column), to the data location in the [NODC JASADCP](#) (center, if present), and to [netcdf files](#) with the ADCP data and predicted barotropic tides (right column).

LIST VIEW

1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2008	2009	2010	2011						

2011

hot228	km1101	2011/01/08 to 2011/01/10	Honolulu, HI to Honolulu, HI
hot229	km1102a	2011/01/27 to 2011/01/31	Honolulu, HI to Honolulu, HI
hot230	km1108	2011/02/27 to 2011/03/03	Honolulu, HI to Honolulu, HI
hot231	km1113	2011/04/10 to 2011/04/14	Honolulu, HI to Honolulu, HI
hot232	kok1107	2011/05/08 to 2011/05/12	Honolulu, HI to Honolulu, HI



Hot Cruise Data

Download this!

Online Data

CRUISE	SONAR	ADCP	PREDICTED TIDE
hot225_km1017	os38bb	short	tpxo7.2 hawaii
	os38nb	short	tpxo7.2 hawaii
	wh300	short	tpxo7.2 hawaii
			hawaii
			hawaii
			hawaii
			hawaii
			hawaii
		short	tpxo7.2 hawaii
		short	
		short	
		short	
		short	
		short	tpxo7.2 hawaii
		short	tpxo7.2 hawaii
	wh300	short	tpxo7.2 hawaii
hot231_km1113	os38bb	short	tpxo7.2 hawaii
	os38nb	short	tpxo7.2 hawaii
	wh300	short	tpxo7.2 hawaii
hot232_kok1107	nb150	short	tpxo7.2 hawaii

Type of the sensor

os38bb (12m bin/1000m)

os38nb (24m bin/1200m)

wh300 (80m)

os75bb (8m bin/600m)

os75nb (16m bin/700m)

nb150 (8m bin/200m)

etc.. Ask Jules Hummon more detail.

ADCP: raw data

Short or long

Short variable list (U and V etc.)

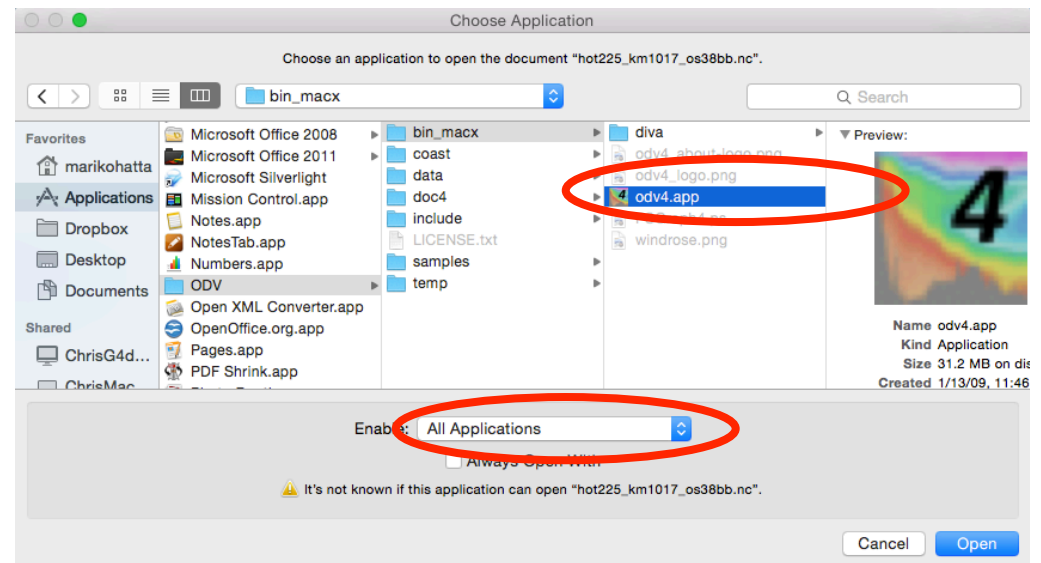
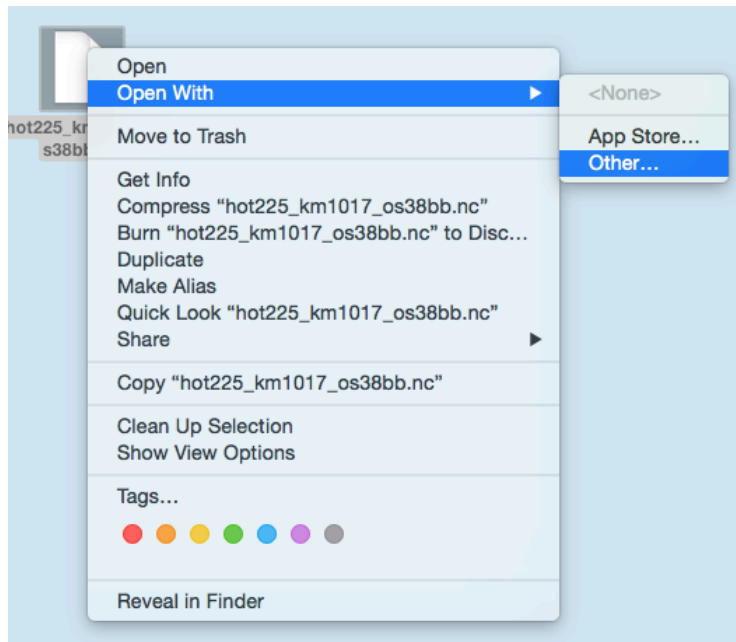
Long variable list (more)

The “Barotropic Tide” data from the models

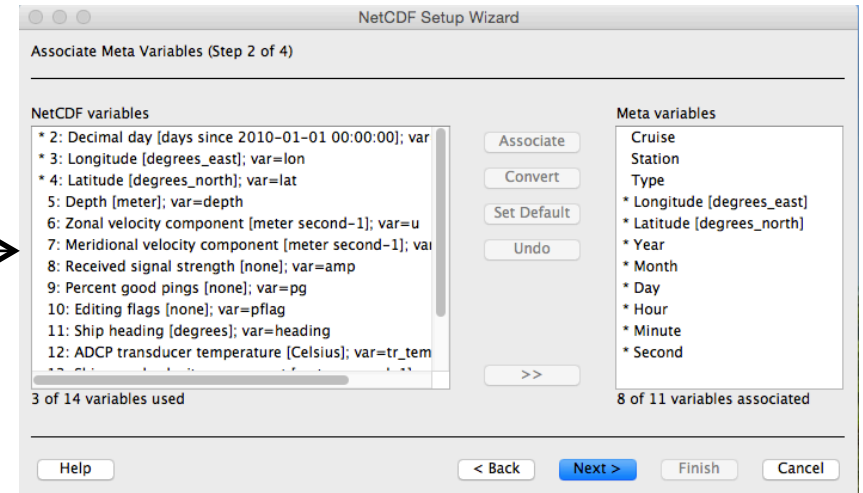
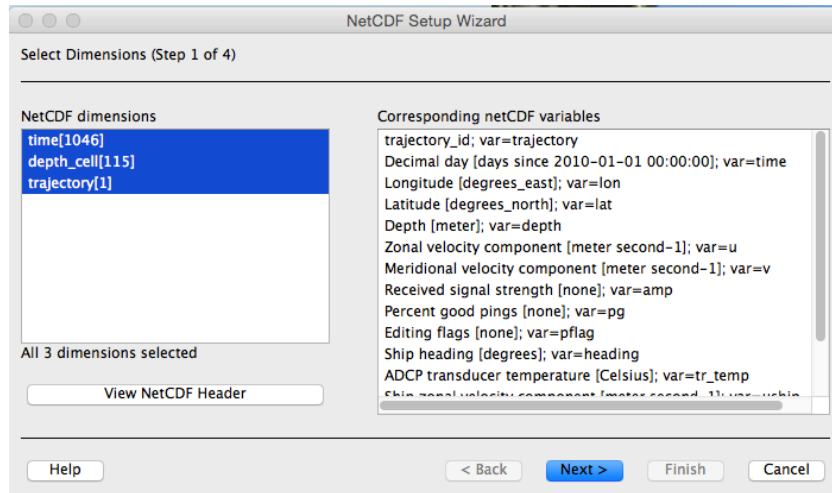
[Back to currents](#)

How to open ADCP data (netCDF)

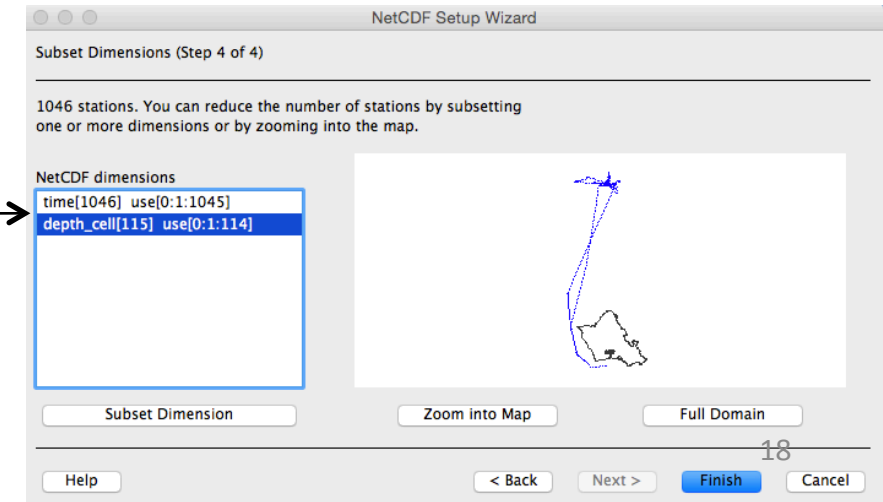
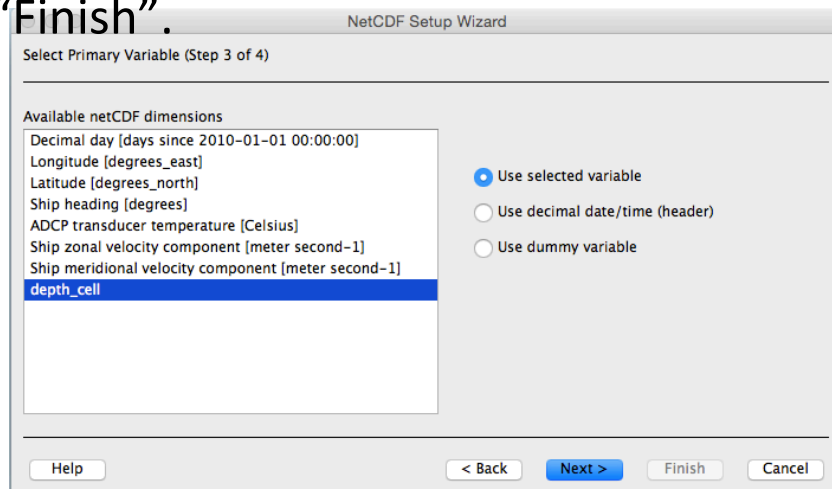
1. After download netCDF file, open XXX.nc file with “Other”. In menu “Choose Application”, enable “All Application” and go to ODV, bin_macx, odv4.app, then open odv4.app



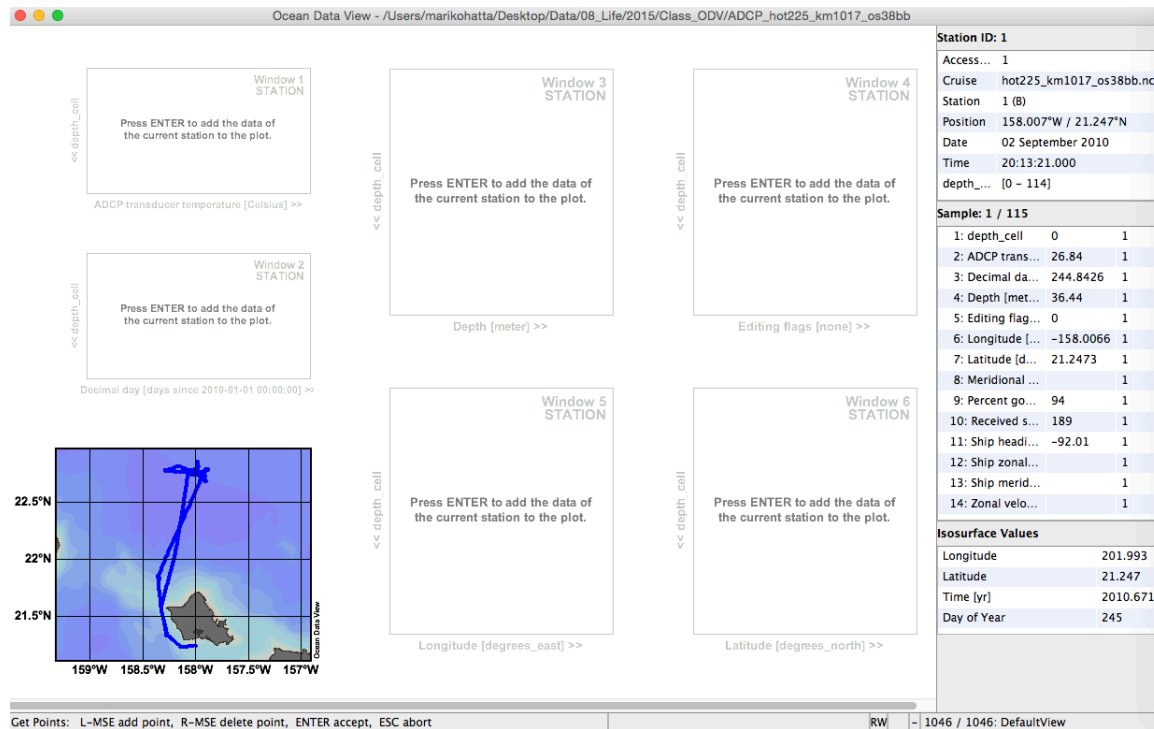
2. Should get “NetCDF Setup Wizard”. Select (highlight) both dimensions shown (at least, “Time” and “depth_cell”). A bunch of corresponding variables should appear to the right, then click “Next”. Should get “Associate Meta Variables” screen; likely you will do nothing but select “Next”.



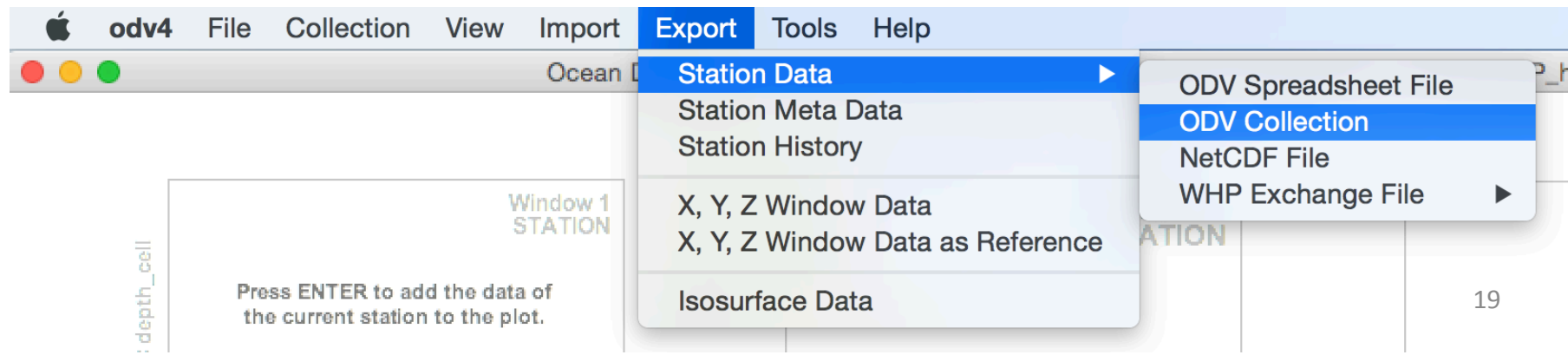
3. Should get “Select Primary Dimension” screen: select “depth_cell” by clicking on it, then click “Next”. Then you should get “Subset Dimensions” screen. Then “Finish”.



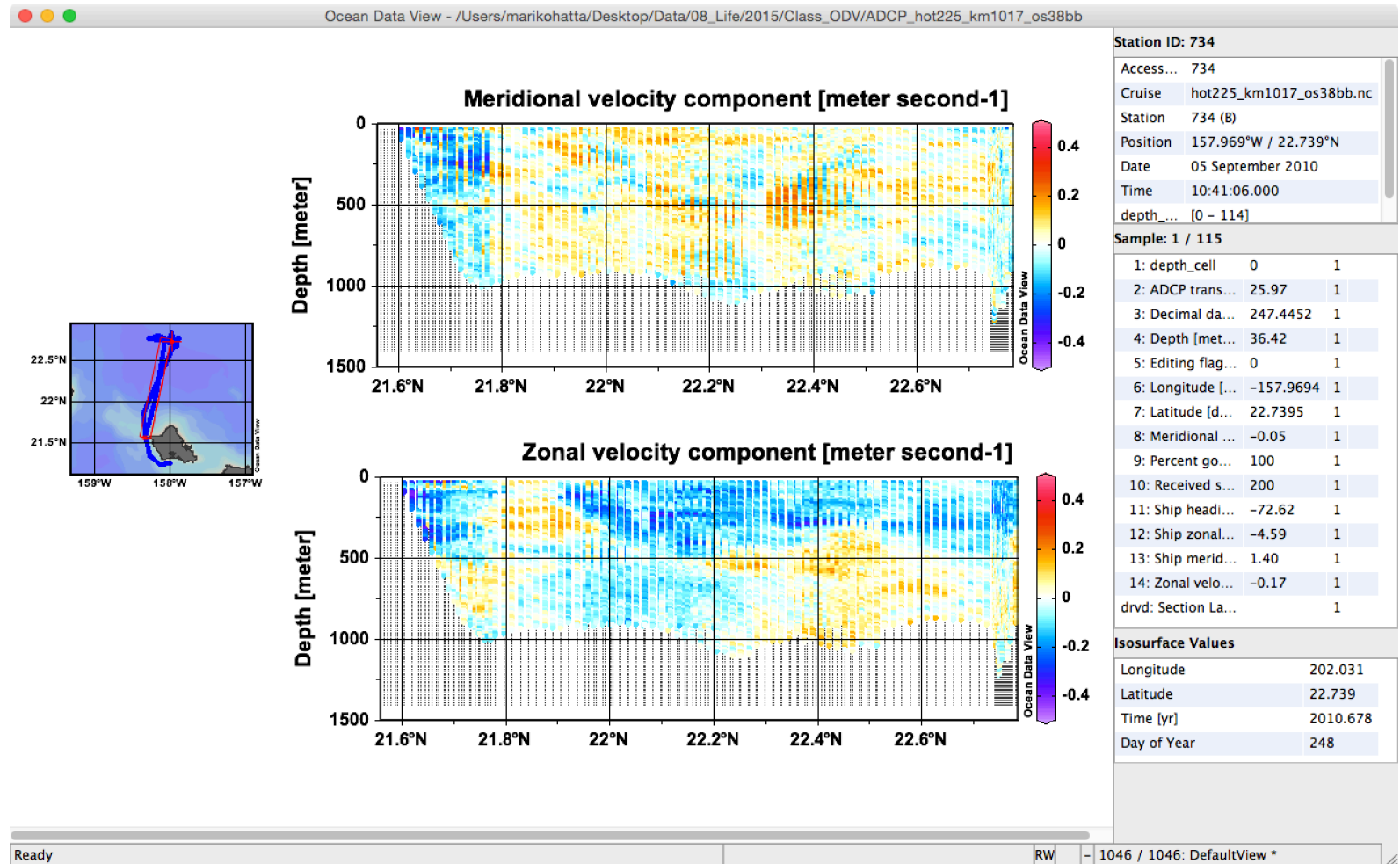
4. You should get the ODV file.



5. You should export the ODV collection. Since the ADCP data is huge, it is easy to crash ODV, so it is the safe thing to do!



6. You can make the section data of ADCP components with “Section Window” mode.



7. Save “View”, then you do not have to make this again! Also you can save the canvas as your favorite format (.jpg/.png/etc..).

How to open US Hydro data set (WOCE bottle/ctd format) with ODV software

1. Go to CCHDO website and select US Hydro data page: <https://cchdo.ucsd.edu/search?q=USHYDRO>

 CCHDO Home Find Data ▾ Submit Data Information ▾ Search

Welcome to the CCHDO

The CCHDO's primary mission is to deliver the highest possible quality global CTD and hydrographic data to users. These data are a product of decades of observations related to the physical characteristics of ocean waters carried out during WOCE, CLIVAR and numerous other oceanographic research programs. Whenever possible we provide these data in three easy-to-use formats: WHP-Exchange (which we recommend for data submissions to the CCHDO), WOCE, and netCDF.

The CCHDO also manages public and non-public CTD data to be used for the global Argo and OceanSITES programs.

This site is funded by the National Science Foundation and the National Oceanic and Atmospheric Administration's Climate Observations Division.

Search

Keyword search is provided by the search box in the upper right of the page. Other options include:

Map Search lets you draw a box on a map to search for station data.

Advanced Search lets you finely define key word, bounding box, and temporal searches.

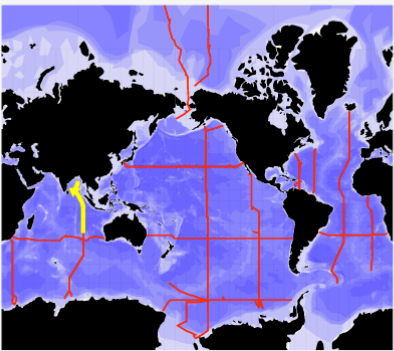
Some Starting Searches

Here are some searches which may be of general interest:

Basins	• Arctic Ocean • Atlantic Ocean • Pacific Ocean • Indian Ocean • Southern Ocean
Programs	• GO-SHIP • SOCCOM • USHYDRO • WOCE • DIMES • ELLETT • Project Carina
Time Series	• Hawaii Ocean Time Series • Bermuda Atlantic Time Series

How to open US Hydro data set (WOCE bottle/ctd format) with ODV software

2. In case that you want to download one of the data from the list, you select the data that you want with your cursor. The cruise track will be highlighted on the map (as yellow).



Filter Table:

Bulk Download Options

Results: 29

Search Tips:

- Click the table headings to sort the results, again to reverse the order.
- Type text in the box above to further filter the results shown in the table.
- To do a new search, use the search box at the top of the page.

Search Results

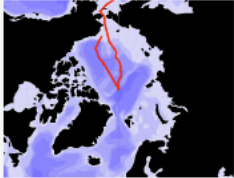
Expcode	Line(s)	Ship	Country	Start Date	End Date	PI
33RR20160321	• I09N	R/V Roger Revelle	US	2016-03-21	2016-04-28	• Leticia Barbero
33RR20160208	• I08S	R/V Roger Revelle	US	2016-02-08	2016-03-06	• Allison Macdonald
33HQ20150809	• ARC01	HEALY	US	2015-08-09	2015-10-12	• Kadko
33RO20150525	• P16N • P16	RONALD H. BROWN	US	2015-05-25	2015-06-25	• Allison Macdonald
33RO20150410	• P16C • P16N • P16	Ronald H. Brown	US	2015-04-10	2015-05-13	• Jessica Cross
320620140320	• P16 • P16S	NATHANIEL B. PALMER	US	2014-03-20	2014-05-05	• Lynne Talley
33RO20131223	• A16S • A23	RONALD H. BROWN	US	2013-12-23	2014-02-04	• Leticia Barbero • Rik Wanninkhof
33RO20130803	• A16N	RONALD H. BROWN	US	2013-08-03		• John L. Bullister • Molly O. Baringer
318M20130321	• P02 • P02E	MELVILLE	US	2013-03-21	2013-06-03	• James Swift • Sabine Mecking
33AT20120419	• A20	ATLANTIS	US	2012-04-19	2012-05-15	• Michael McCartney
33AT20120324	• A22	ATLANTIS	US	2012-03-24	2012-04-17	• Ruth Curry
33RO20110926	• A10	RONALD H. BROWN	US	2011-09-26	2011-10-31	• Allison Macdonald • Molly O. Baringer

You can see the Data set Information. You select “**bottle exchange**” or “**ctd exchange**” for ODV formatted data file. File will download to your computer.

 CCHDO Home Find Data ▾ Submit Data Information ▾

Search

Hydrographic Cruise: 33HQ20150809



Date Start/End:
2015-08-09/2015-10-12

Chief Scientist:
[Kadko](#)

Ship:
[HEALY](#)

Country:
[US](#)

Collections
[arctic](#) [USHYDRO](#)
[GEOTRACES](#) [GO-SHIP](#)
[ARC01](#)

Aliases
(CCHDO) 32H120150809

DOIs
[10.7942/C2MW25](#)

Dataset

Files in the Dataset are the data for this cruise. They are updated when new data are submitted or as needed.

[Download Entire Dataset](#) [Submit Data For This Cruise](#)

bottle

- **exchange:** [33HQ20150809_hy1.csv](#) (1.9 MB)
- **whp_netcdf:** [33HQ20150809_nc_hyd.zip](#) (885.1 kB)

ctd

- **exchange:** [33HQ20150809_ct1.zip](#) (2.5 MB)
- **whp_netcdf:** [33HQ20150809_nc_ctd.zip](#) (2.9 MB)

documentation

- **pdf:** [33HQ20150809_do.pdf](#) (4.7 MB)
- **text:** [33HQ20150809_do.txt](#) (136.0 kB)

Unmerged Data as Received

Files listed here are updates to the dataset which have not been processed yet, they may not be well formatted. Data files listed here usually contain the most up to date versions of the data for specific parameters. If you are unsure of which files to use, stick to the Dataset files above.

These files are not yet in the Dataset.

Filename (Download)	Size	Date Submitted
33HQ20150809.exc.csv	1.2 MB	2018-01-10

Data History

Files and History Notes

← Bottle data

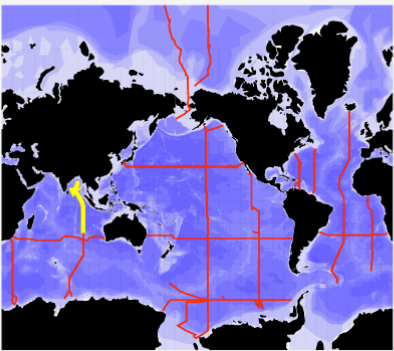
← CTD data

How to open US Hydro data set (WOCE bottle/ctd format) with ODV software

3. In case that you want to download all of the data in this list, you click “**Bulk Download Option**” and select “**Download all exchange bottle files**” or “**Download all exchange ctd files**”.

CCHDO Home Find Data Submit Data Information

Q USHYDRO Search



Filter Table:

Bulk Download Options

Results: 29

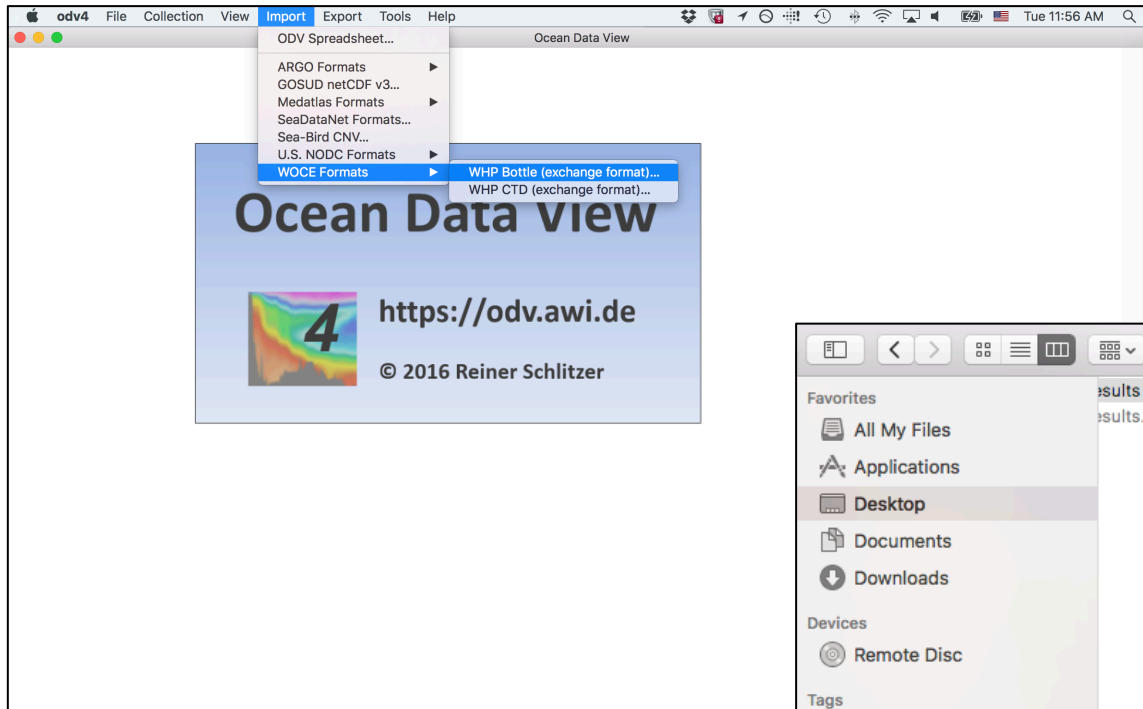
Search Tips:

- Click the table headings to sort the order.
- Type text in the box above to filter the table.
- To do a new search, use the search box.

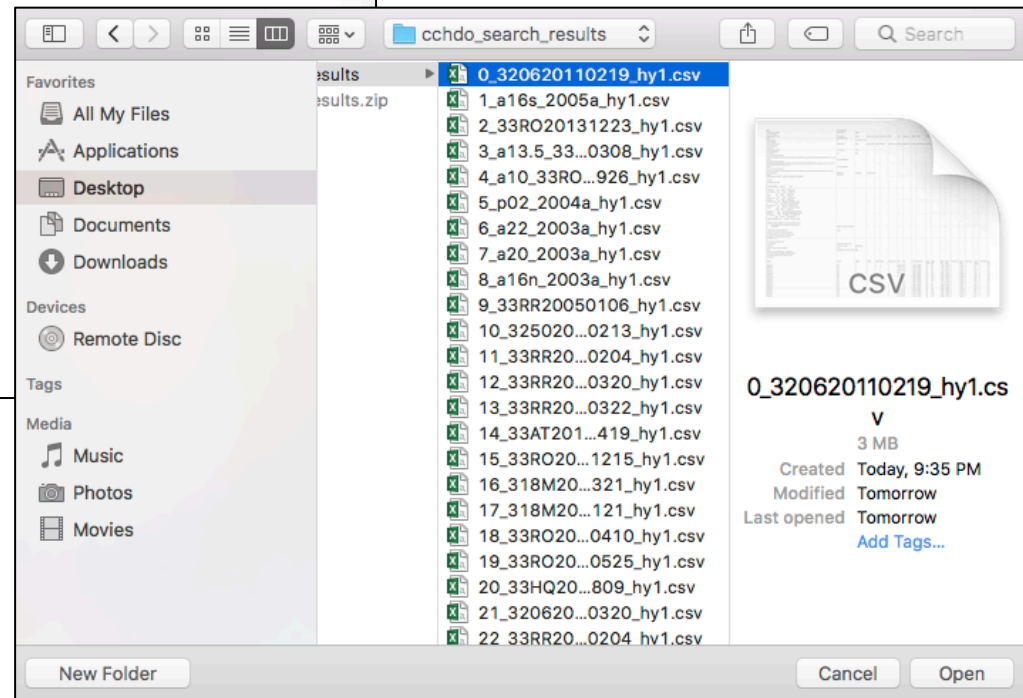
Search Results

Expcocode	Line(s)	Ship	Country	Start Date	End Date	PI
33RR20160321	• I09N	R/V Roger Revelle	US	2016-03-21	2016-04-28	• Leticia Barbero
33RR20160208	• I08S	R/V Roger Revelle	US	2016-02-08	2016-03-06	• Allison Macdonald
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320620140320	• P16 • P16S	NATHANIEL B. PALMER	US	2014-03-20	2014-05-05	• Lynne Talley
33RR20131223	• P16S • P23	RONALD H. BROWN	US	2013-12-23	2014-02-04	• Leticia Barbero • Rik Wanninkhof
33RR20130803	• P16N	RONALD H. BROWN	US	2013-08-03		• John L. Bullister • Molly O. Baringer
33RR20130321	• P02 • P02E	MELVILLE	US	2013-03-21	2013-06-03	• James Swift • Sabine Mecking
33RR20120419	• P20	ATLANTIS	US	2012-04-19	2012-05-15	• Michael McCartney
33RR20120324	• P22	ATLANTIS	US	2012-03-24	2012-04-17	• Ruth Curry
33RR20110926	• P10	RONALD H. BROWN	US	2011-09-26	2011-10-31	• Allison Macdonald • Molly O. Baringer

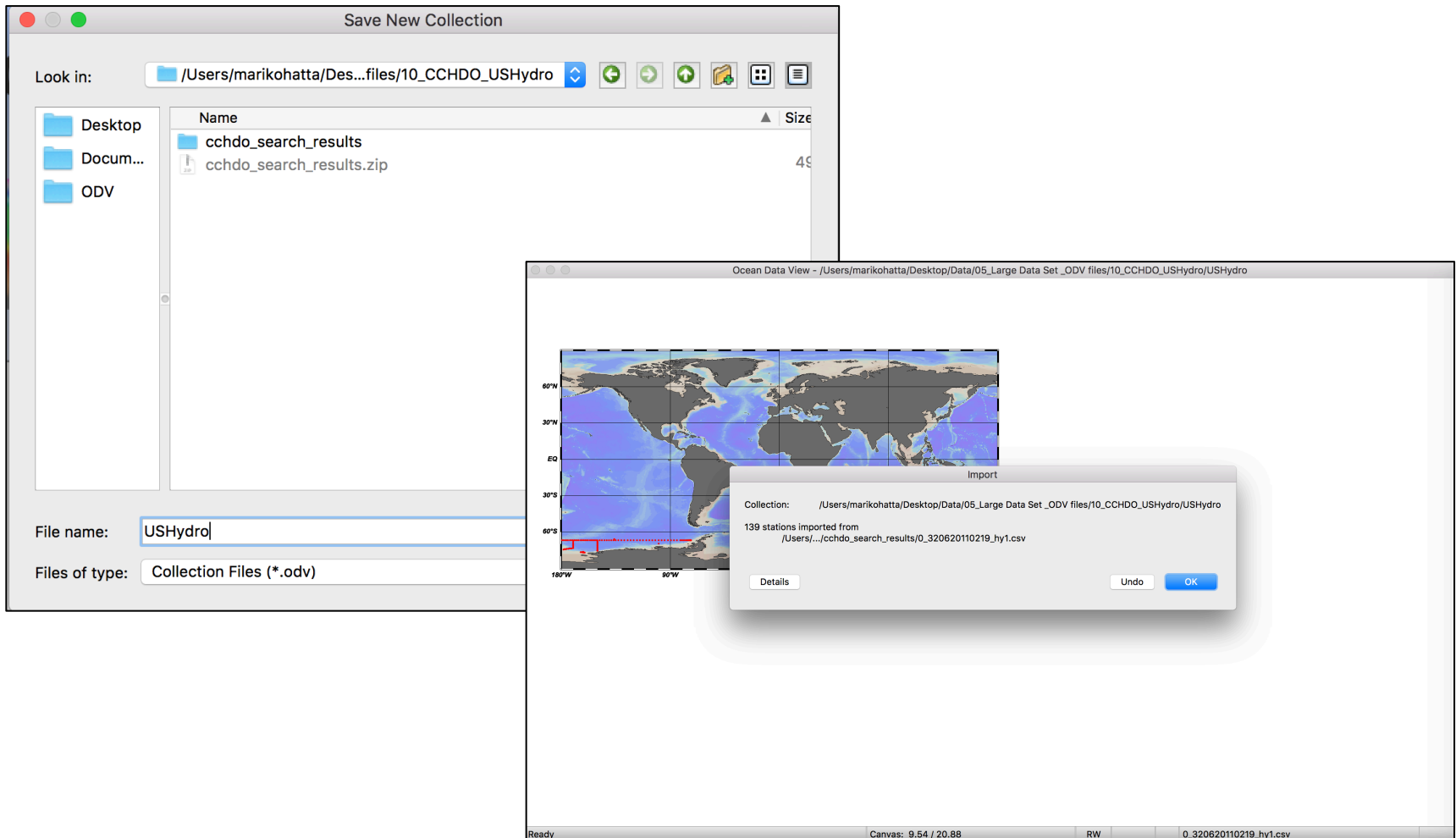
4. Open ODV and select “Import” – “WOCE Format” – “WHP Bottle (exchange format)” or “WHP CTD (exchange format)”.



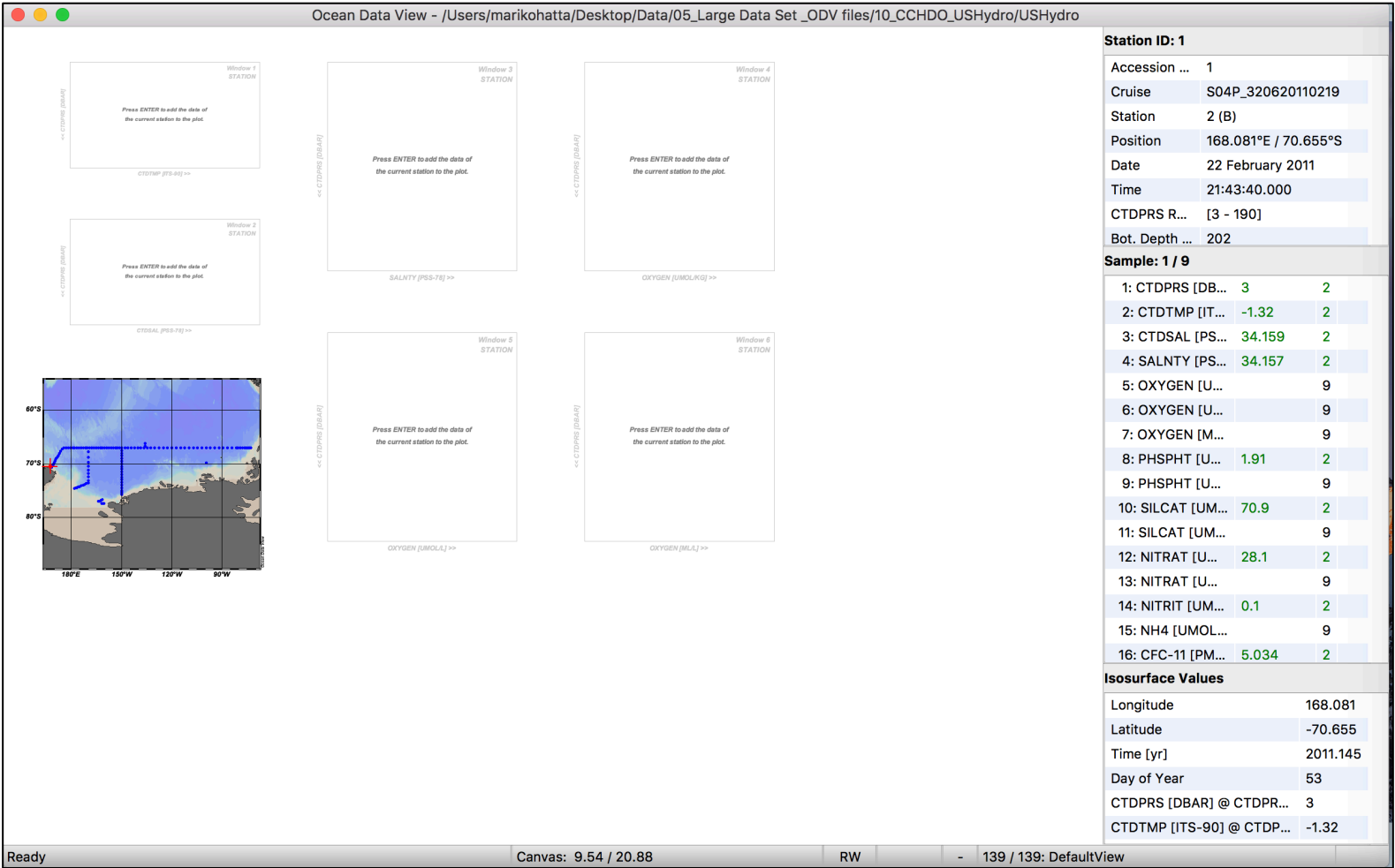
5. Select data file that you want to import. Note that you can select multiple files if you want.



6. Select the location that you want to say this ODV file, and save as your preferable file name.



Done!



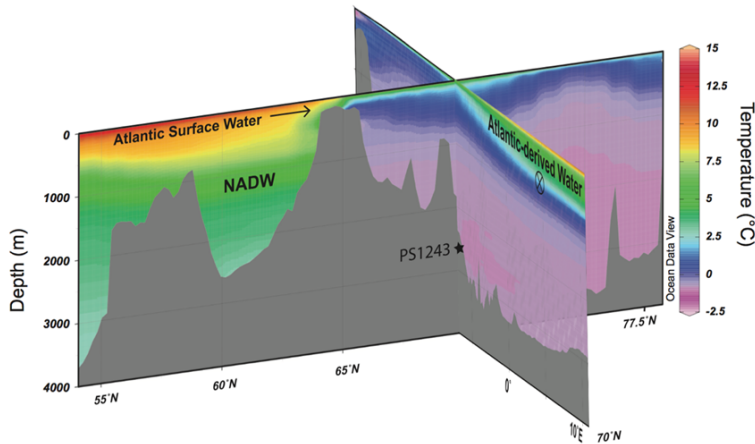
Questions:

- “I am interested in how to draw the 3D plot by ODV”

Answer: I do not think that I can do this using current ODV software.

Dr. Benoit Thibodeau said “It was done by plotting two sections on ODV and then using the 3D tool in illustrator.”

Reiner said “Concerning Ocean3D there are no news, still far from being ready for general distribution. The composed figure is cool.”



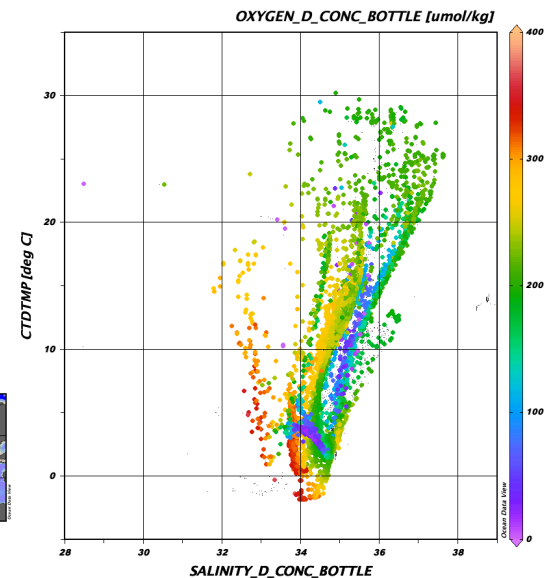
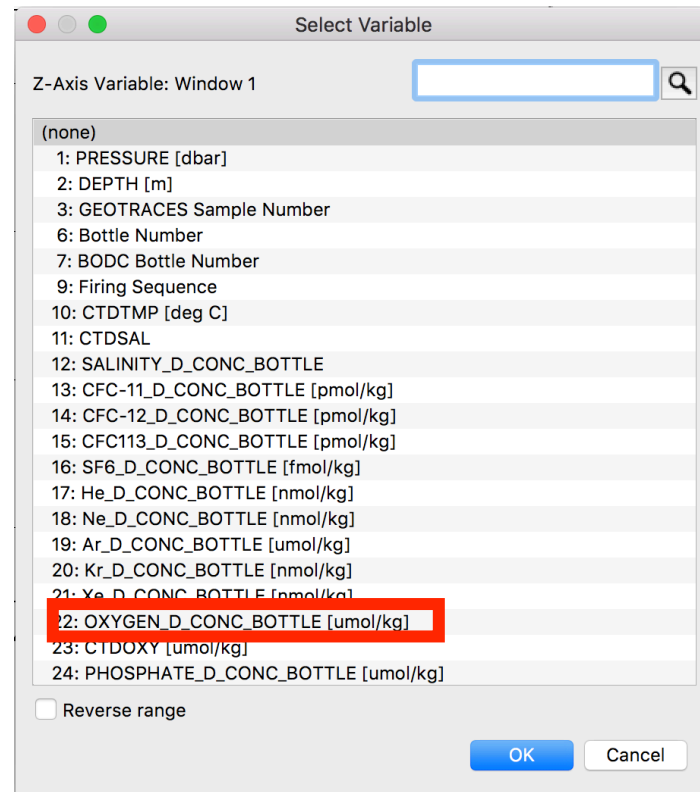
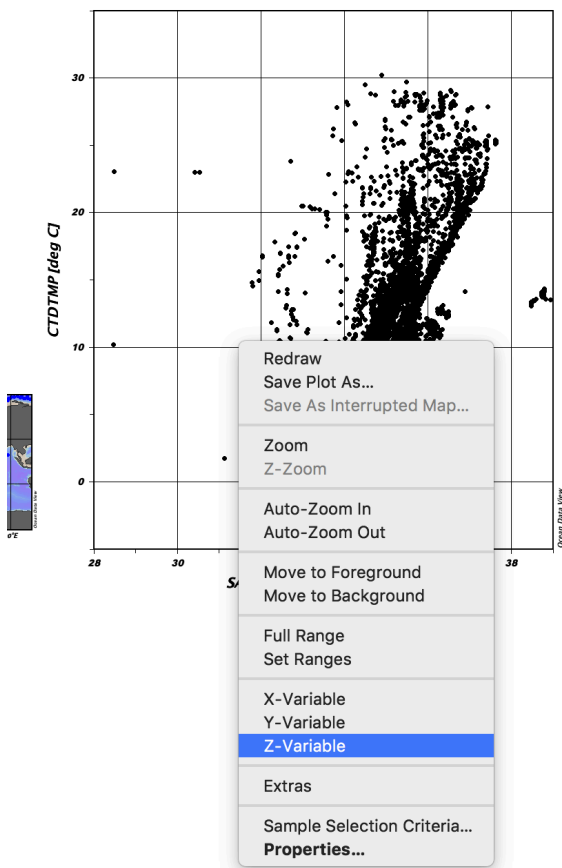
Thibodeau et al., EPSL 457, 2017

Dr. Benoit Thibodeau
Research Assistant Professor & Honorary Assistant Professor
Environmental Geochemistry & Oceanography Research
Group
Department of Earth Sciences & Swire Institute for Marine
Science
The University of Hong Kong

Questions:

- “How to plot two-dimension graph like T-S, X-Y axis with scale color bar?”

Answer: Need to select Z-axis with one parameter and change the color.

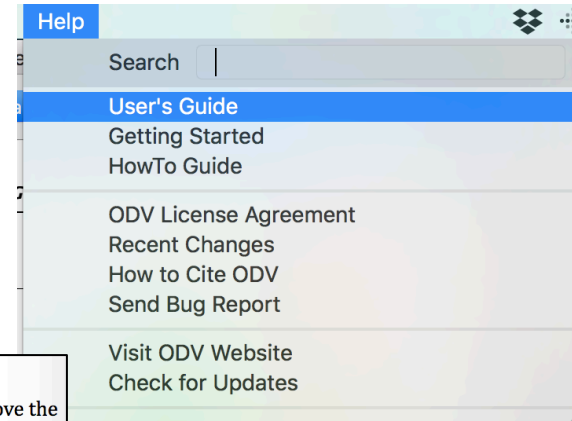


- “How to distinguish different water masses in a T-S diagram by color.”

Answer: Check “Help” – “User’s Guide”.

Read Section 6 “Derive variables”

– “6.5 Patches”



6.5 Patches

You can define water-mass patches by specifying polygons in the X/Y space of any data plot currently displayed on the screen. To do so, move the mouse over the data plot that you want to use for definition (e.g., theta/S plot) and click the right mouse button. From the popup menu choose *Extras > Define Patch* (note that the cursor changes to a cross-hair) and define the nodes of the patch-polygon by clicking the left mouse button at the node positions. You may delete points by moving the mouse close to the respective point and clicking the right button. Terminate definition of the polygon by pressing *Enter* or double-clicking the left mouse button. Note that the polygon is automatically closed by ODV. ODV then prompts you for a patch name (no extension) and writes the patch definition to a file in the collection directory.

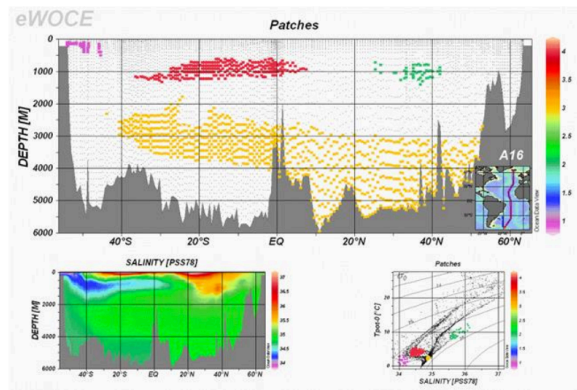
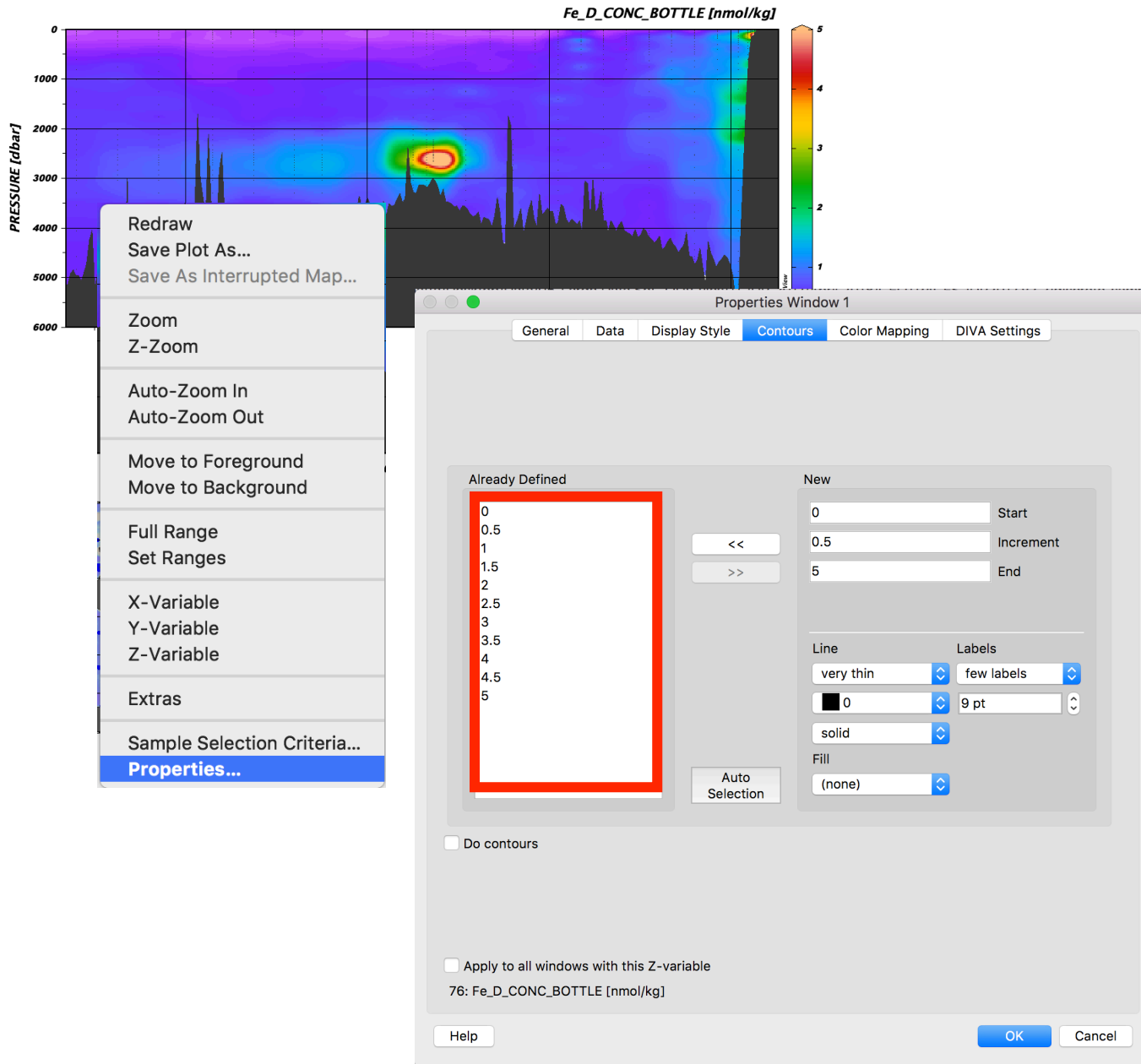


Figure 6-5: Using patches to identify the extent of water masses

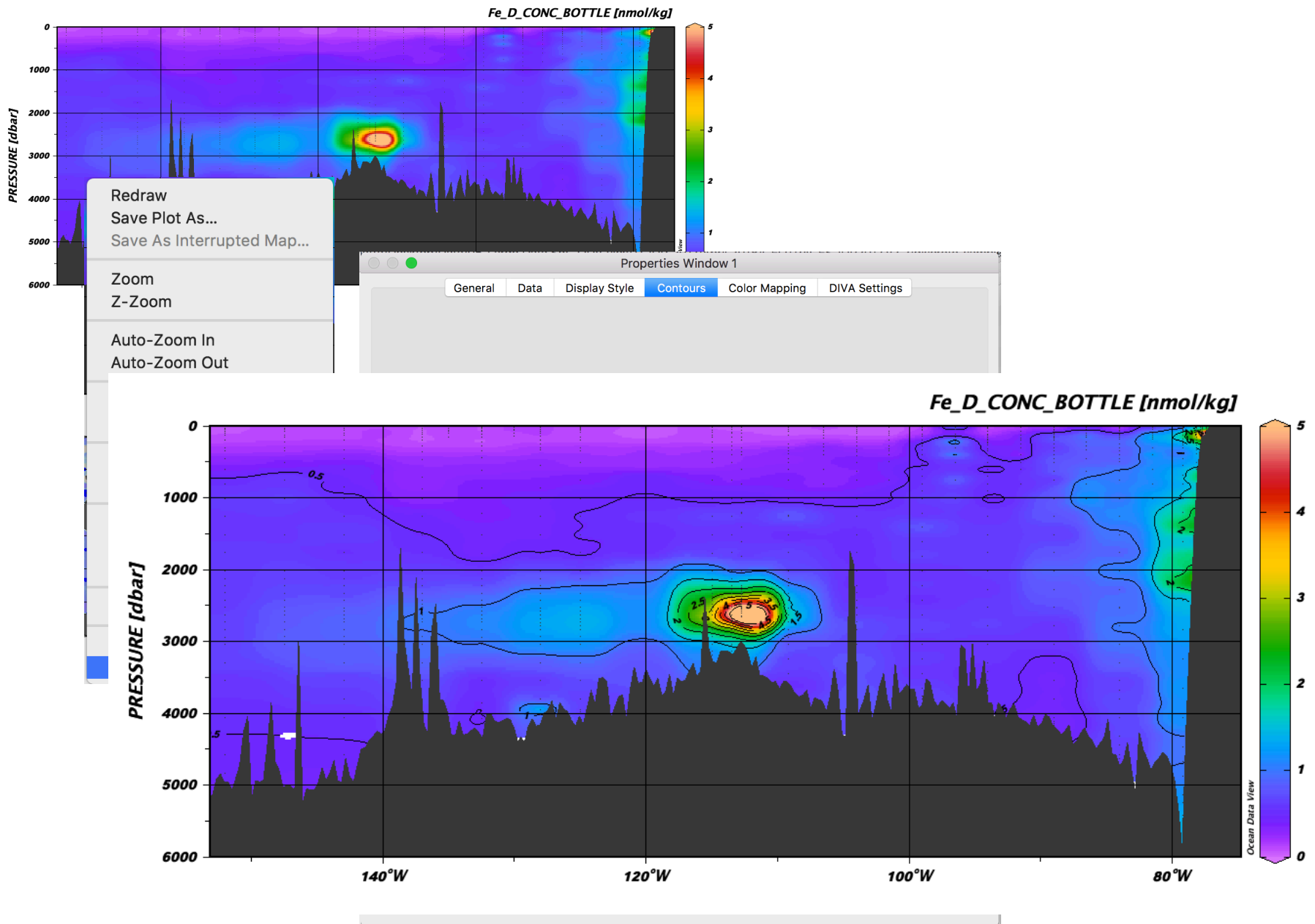
Once you have defined one or more water-mass patches for a collection, you can use them to compose and activate the derived variable *Patches*. Choose *View > Derived Variables* and select *Patches* from the *Choices* list. You can compose the *Patches* variable by selecting one or more of the available water-mass patches (defined previously as described above) into it. Press *OK* when you are done. To evaluate the *Patches* variable for a given sample, ODV determines whether the sample is inside one of the patch-polygons selected into the variable, and (if found) assigns the number of the respective patch as *Patches* value. If the sample is outside all the selected patches, its value is set to the missing data value.

Like all other variables (basic or derived) you can use the *Patches* variable on any axis of any data window. Use it, for instance, as Z-variable along sections or for isosurface variables in order to display the spatial extent of specific water masses (see Figure 6-5).

- How to add contour lines?



- How to add contour lines?



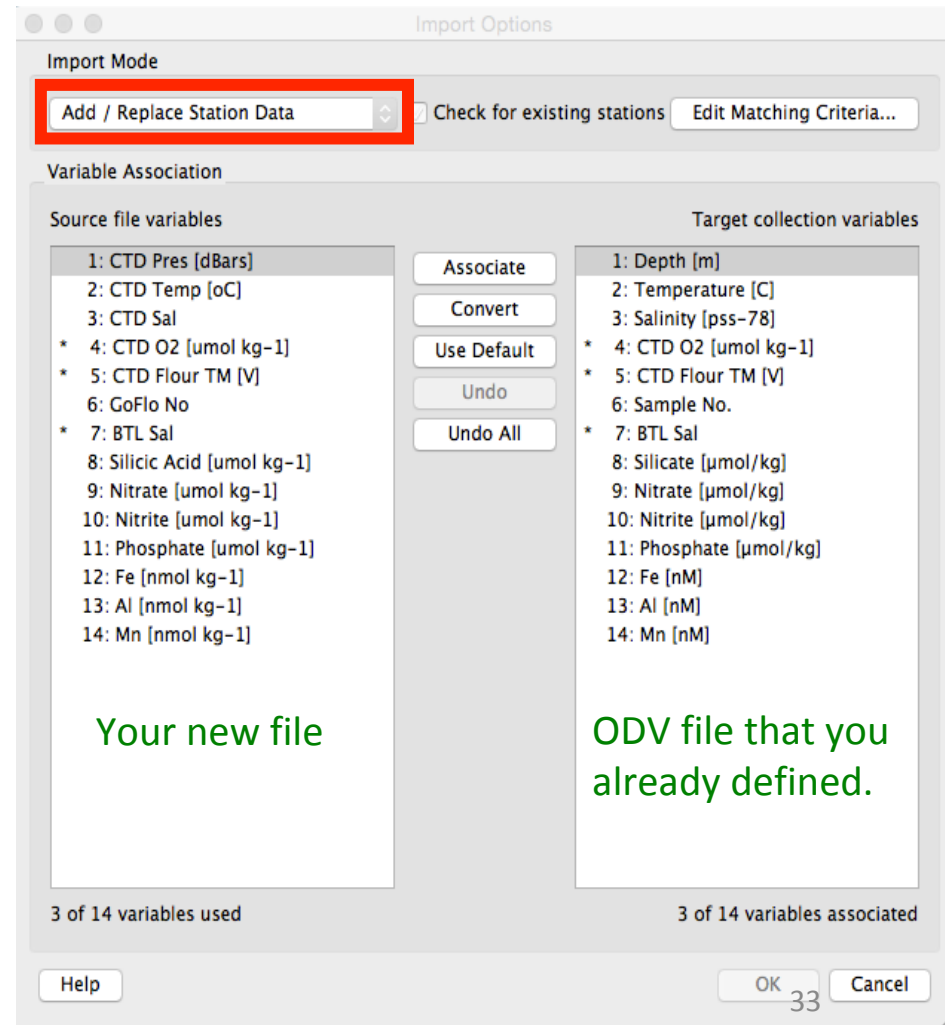
- “How to revise the data?”

Answer: Click “Import”, and select your file that you made. Select “Import Mode” type as you wish. You can select “Matching criteria” if you like.

This step imports your data into ODV. Now you can see which your data in the spreadsheet on the screen as “Source file variables” and your ODV data as “Target collection variables”.

Tip: If you want to import additional data into an existing file, you need to associate the new variables with the existing file “Target collection variables”.

- *When you use the same parameter names, it should be automatically associated.*
- *When you have the data name “Source file” is different from the original “Target collection variables”, you need to select the parameter name and associate with “Target collection” manually.*



- “How to revise label directly instead of importing another spreadsheet?”

Answer: If you want to change the existing *variable name*, need to select “Collection” – “Properties” – “Data Variables”. Then, select the parameter you want to change the name.

The screenshot shows the ODV (Ocean Data View) software interface. The 'Collection' menu is open, showing options like 'Copy...', 'Create Snapshot...', 'Move / Rename...', 'Delete', 'Sort and Condense', 'Delete Current Station', 'Delete Station Subset', 'Browse Info File', 'Browse Inventory', 'Browse Log File', 'Add Log File Comment', 'Create Overview Plots', 'Identify Key Variables...', 'Good Coverage Criteria...', and 'Properties'. The 'Properties' option is selected, and the 'Data Variables' dialog box is open. The dialog box lists 23 variables, with '12: SALINITY_D_CONC_BOTTLE' selected. The 'Edit' button is highlighted with a red box. The background shows a map of the Pacific Ocean with '1966 Stations' and a plot of 'Fe_D_CONC_BOTTLE [nmol/kg]'.

odv File Collection View Import Export Tools Help

Ocean Data View

Fe distribution at various depths(1)

Sample_Data

Fe_D_CONC_BOTTLE [nmol/kg]

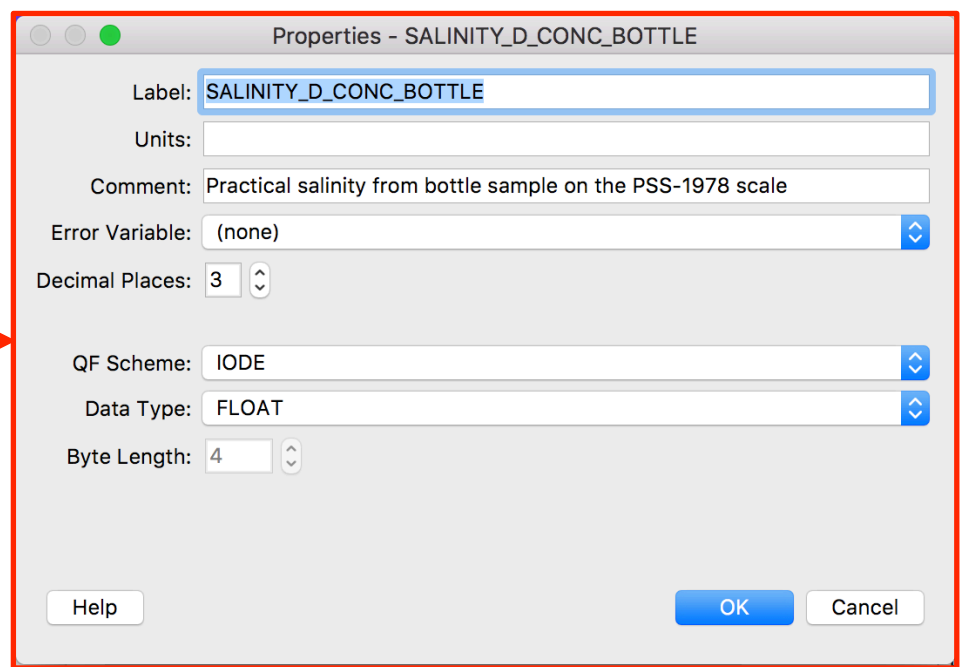
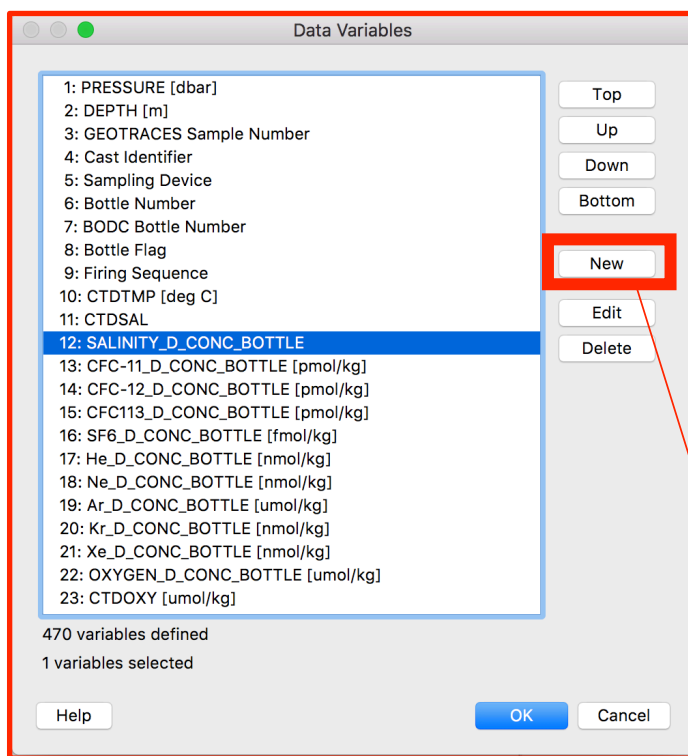
1966 Stations

DATA VARIABLES

1: PRESSURE [dbar]
2: DEPTH [m]
3: GEOTRACES Sample Number
4: Cast Identifier
5: Sampling Device
6: Bottle Number
7: BODC Bottle Number
8: Bottle Flag
9: Firing Sequence
10: CTD TMP [deg C]
11: CTDSAL
12: SALINITY_D_CONC_BOTTLE
13: CFC-11_D_CONC_BOTTLE [pmol/kg]
14: CFC-12_D_CONC_BOTTLE [pmol/kg]
15: CFC113_D_CONC_BOTTLE [pmol/kg]
16: SF6_D_CONC_BOTTLE [fmol/kg]
17: He_D_CONC_BOTTLE [nmol/kg]
18: Ne_D_CONC_BOTTLE [nmol/kg]
19: Ar_D_CONC_BOTTLE [umol/kg]
20: Kr_D_CONC_BOTTLE [nmol/kg]
21: Xe_D_CONC_BOTTLE [nmol/kg]
22: OXYGEN_D_CONC_BOTTLE [umol/kg]
23: CTDOXY [umol/kg]

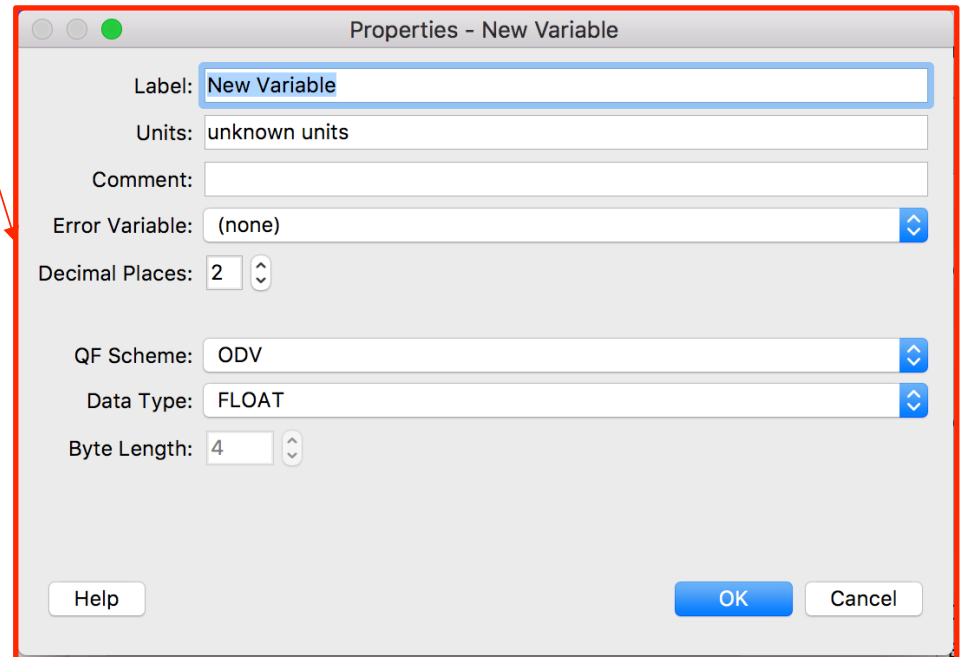
470 variables defined
1 variables selected

Help OK Cancel



If you want to add the new variables, click “New” and add the information.

*Tip: Careful for the “Decimal Places”
When you want to add 3 decimal numbers (i.e. 0.003) but select here as “2 decimal places” your data will be all “0”.
“QF Scheme” is also important.*



“I want to learn some drawing skills about atmospheric field using ODV.”

Answer: Software can be used for atmospheric filed data.

Download “**Discrete Aerosol and Rain Data** [ODV format](#)(33.9 MB) IDP2017 digital dataset” and look at the data how it is.

<https://www.bodc.ac.uk/geotraces/data/idp2017/>

Click

CTD Sensor Data

- CTD Sensor Data — [ODV format](#) (113.2 MB) IDP2017 digital dataset
- CTD Sensor Data — [ASCII format](#) (38.4 MB) IDP2017 digital dataset
- CTD Sensor Data — [NetCDF format](#) (24.5 MB) IDP2017 digital dataset

Discrete Sample Data

- Discrete Sample Data — [ODV format](#) (138.5 MB) IDP2017 digital dataset
- Discrete Sample Data — [ASCII format](#) (9.0 MB) IDP2017 digital dataset
- Discrete Sample Data — [Excel format](#) (71.6 MB) IDP2017 digital dataset
- Discrete Sample Data — [NetCDF format](#) (10.7 MB) IDP2017 digital dataset

Aerosol and Rain Data

- Aerosol and Rain Data — [ODV format](#) (33.9 MB) IDP2017 digital dataset
- Aerosol and Rain Data — [ASCII format](#) (2.0 MB) IDP2017 digital dataset
- Aerosol and Rain Data — [Excel format](#) (2.2 MB) IDP2017 digital dataset
- Aerosol and Rain Data — [NetCDF format](#) (2.0 MB) IDP2017 digital dataset

Note: The citation to use for IDP2017 is that given in the [download agreement](#) (since the IDP2017 paper is not published yet), that is:

Thank you very much!