Basic Data analysis with ODV

- Save the OSD file in Documents\ODV\DATA with the filename osd_wod.gz.
- Similarly save the CTD and PFL files this folder.

 Please copy all the data provided, to the folder User\Documents\ODV\Data for ease of handling/importing during this training session

Options:

- To view the full screen map, select View > Layout Templates > Full Screen Map.
- To save the current view, select View > Save View As and name the view station_map.
- To save the distribution map as an image, right-click on the map and select Save Map As then specify the file name and select the file type.

Other Options:

- Change Projection
- Zoom to desired
- Add graphic objects
- Explore menu options

Keep in mind:

- Save views and plots frequently, whenever needed
- Undo options are limited

Task:

• Import the other WOD datasets (CTD, PFL) into the existing collection.

Basic plotting using ODV

Part 1: Station plot

1. Draw a station plot:

- Open the OSD collection previously created.
- Select View > Layout Templates to show a list of predefined window layout templates.
- Select 1 STATION Window.

Undo •	Default
 Redo •	
Station Filter Alt+S	
Derived Variables Alt+D	
isosurface Variables	
Window Properties	
Window Layout Alt+W	
Layout Templates •	Full Screen Map F8
Save View As	1 STATION Window
Save View	2 STATION Windows
Load Views Shift+L	6 STATION Windows F9
Browse Session Log File	1 SCATTER Window
Settings	2 SCATTER Windows F10
	6 SCATTER Windows
	1 SECTION Window
	2 SECTION Windows
	3 SECTION Windows F11
	5 SECTION Windows
	6 SECTION Windows
	1 SURFACE Window F12
	2 SURFACE Windows
	3 SURFACE Windows
	5 SURFACE Windows
	8 SURFACE Windows
	11 SURFACE Windows
	1 SURFACE + 1 SCATTER Windows
	1 SURFACE + 1 SCATTER Windows 5 MIXED Windows

- **Press Enter** to plot the default station indicated by the small red cross on the map.
- Select other stations on the map to plot their profiles, temporarily, on the graph.
- Double-click on any station to make it appear permanently on the plot.



2. Adjust the variable in a station plot:

- To change the x or y variables in the station plot, right click on the station plot and choose X-Variable or Y-Variable
 - For example, select X-Variable and choose Salinity to display the salinity profile.



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- Right click on the plotand choose Set Rangesthen set the range for theX and Y variables.
- For example, set the depth range to 0 - 1000m or the salinity range to 34 to 37 psu.
- Right click and select
 Full Range to set the full range of the values.

Redraw	F5
Save Plot As	Ctrl+S
Save As Interrupted Map.	
Zoom	
Z-Zoom	
Auto-Zoom In	Ctrl++
Auto-Zoom Out	Ctrl+-
Move to Foreground	
Move to Background	
Full Range	Ctrl+F
Set Ranges	
X-Variable	х
Y-Variable	Υ
Z-Variable	Z
Extras	•
Sample Filter	+
Properties	Alt+P

	nity [psu]
Minimum:	34
Maximum:	37
Marin De	uh [1
Y Axis: Dep	ith [m]
Minimum:	0
Maximum:	1000
Minimum:	

3. Edit station plot properties :

To change the figure properties, select the station on the map then right click the map window and choose Manage Pick List > Edit **Pick List to change the** symbol type and colour and the line.

Properties	Alt+P	-		
Extras	•		Edit Pick List	
			Close Dick List	
Manage Section	۰.		Remove Current Station from Pick List	Del
Manage Pick List	•		Add Current Station to Pick List	Enter
Station Filter	Alt+S			
Current Station by	•			
Global Map				
Full Domain	Ctrl+F			
Valid Domain				
Auto-Zoom Out	Ctrl+-			
Auto-Zoom in	Ctrl++	L .		
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Zoom				
Save As Interrupted Map				
Save Map As	Ctrl+S			
Redraw	F5	L .		

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1		25.79	WOD 18_94000001	387065 (0)	644
1		126.76	WOD18_08026405	13434848 (8)	1
·		12209	WOD 18_LING 36 744	17902454.00	Renove
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-	Symbol				Furning
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- To change the symbols of the stations on the map, right click on the map and select Properties > Display Style and change the colour and size of the symbol.
- Under Annotations you can add annotations about the cruise and station labels to the stations on the map window.



Other Options:

- Add graphic objects to station plot
 - Text (Annotation)
 - Symbol
 - Polygon

Task:

• Make station plot with oxygen on X-axis (oxygen profile with depth)

4. Station metadata and data

- The top panel (Station ID) contains the metadata about the cruise.
- The metadata includes the Accession No, cruise, station, position, data and time.
- The second panel (Sample) lists the depth and values of each variable measured at the station.

Station ID: 1	15599				
Accessio	13213	1			^
Cruise	WOD	18_US0363	98		
Station	17902	454 (B)			
Position	67.64	9°E / 18.92	3°N		
Date	10 De	cember 20	16		
Time	06:53				
Depth Ra	[5 - 1	188]			
Bot. Dept					
OCL Crui	36398	5			
Originato	29014	78			
Originato					4
Complex 12	1 47				0
Sample: 15	/ 4/				~
1: Depth [I	m]		65	0	^
2: Temper	ature [degrees	27.14	0	
3: Salinity	[psu]		36.870	0	
4: Oxygen	[µmol	/kg]		0	
5: Phosph	ate [µr	nol/kg]		0	
6: Silicate	[µmol/	/kg]		0	
7: Nitrate	[µmol/	'kg]		0	
8: Nitrite [µmol/	kg]		0	
9: pH				0	
10: Chloro	phyll [µg/l]		0	
11: Plankto	n/Bio	mass		0	
12: Alkalini	ty [me	eq/l]		0	
13: NO2+N	ΙΟ3 [μ	mol/kg]		0	
14: pCO2 [µatm]			0	
15: tCO2 [r	nmol/	11		0	~
Isosurface \	/alues				
Longitude				67.649	^
Latitude				18.923	
Time [yr]				2016.941	
Day of Year				345	
Depth [m] (Dept	h [m]=firs	t	5	
Temperatur	e [deg	rees_C] @	Depth [m	27.19	
6 F 5 F	ENT AND BEACH				~

Part 2: Scatter plot

1. Draw a scatter plot:

- Select View > Layout Templates to show a list of predefined window layout templates.
- Select 1 SCATTER Window.

Station Filter	Alt+S		
Derived Variables Isosurface Variables	Alt+D		
Window Properties	+		
Window Layout	Alt+W		
Layout Templates	•	Full Screen Map	F8
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Browse Session Log File		1 SCATTER Window	
Settings		2 SCATTER Windows 6 SCATTER Windows	F10
		1 SECTION Windows 2 SECTION Windows 3 SECTION Windows 5 SECTION Windows 6 SECTION Windows	F11
		1 SURFACE Windows 2 SURFACE Windows 3 SURFACE Windows 5 SURFACE Windows 8 SURFACE Windows 11 SURFACE Windows 1 SURFACE + 1 SCATTER Windows	F12
		5 MIXED Windows	
		From View File	

Scatter plot:



2. Plot a Temperaturesalinity scatter

- Right click on the scatter diagram
- Change the X-Variable to Salinity
- Then change the Yvariable to Temperature

Redraw	F5	Select Variable		
Save Plot As	Ctrl+S	X-Axe Variable: Window 1]
Zoom Z-Zoom		1: Depth [m] 2: Temperature [degrees_C] 3: Safnty [jssu] 4: Oxygen [jsmok/kg] 5: Phosphate [jsmok/kg] 6: Phosphate [jsmok/kg]		
Auto-Zoom In Auto-Zoom Out	Ctrl++ Ctrl+-	7: Nitrate (µmol/kg) 6: Nitrate (µmol/kg) 9: pH		
Move to Foreground Move to Background		10: Ohlorophyll (pg/) 11: Planktory/Barness 12: Akalenty (sec./) 13: NO2+NO3 (proj/g) 14: xO2+NO3 (proj/g)		
Full Range Set Ranges	Ctrl+F	LS: KCO2 [mms] LS: Tritum [TU] 17: Hekun [mms]/kg] 18: 53Hz [Yk]		
X-Variable	Х	19: 614C [%m] 20: 513C [%m]		
Y-Variable	Y	21: Argon [rmoi/kg]		
Z-Variable	Z	23: CPC11 [pmo]/kg] 24: CPC12 [pmo]/kg]		
Extras	+	25: CFC113 [pmo[Ag] 26: 5180 [%w]		
Sample Filter	+	Reverse range		
Properties	Alt+P		OK	Cancel

Redraw	F5	Select Variable		1
Save Plot As Save As Interrupted Map	Ctrl+S	T-Axis Variable: Window 1		9
Zoom Z-Zoom		1: Cepth [n] 2: Tengenature [Segrees_C] 2: Sainty [pin] 4: Cergen [jens]Ag] 5: Phograde [unolAg]		
Auto-Zoom In Auto-Zoom Out	Ctrl++ Ctrl+-	6: Sikcate (janolAg) 7: fétrate (janolAg) 8: fétrate (janolAg) 9: per		
Move to Foreground Move to Background		10: Chierophyli (µp)() 11: Plankton-ternatis 12: Akalesty [sect] 13: NO2+HO3 [µno]4g] 14: oCO2 lasted		
Full Range Set Ranges	Ctrl+F	15: SCO2 (mmel/l) 16: Tribure (TU) 17: Helium (mol/kg) 18: 53% (%)		
X-Variable	х	19: 514C [%e] 30: 513C [%e]		
Y-Variable	γ	21/ Argen (nms/kg) 22: Neon (nms/kg)		
Z-Variable	Z	23: CPC11 [pmi/kg] 24: CPC12 [pmi/kg]		
Extras	•	25: 0PC113 [pino]Ag[25: 8180 [%-]		5
Sample Filter	•	Røverse range	OK	Cancel
Properties	Alt+P			

3. Set axis limits

- Right click on the scatter diagram > Set ranges
- Set temperature range to 0-35 and salinity range to 30-40 to ignore the outliers/ bad data

Redraw Save Plot As	F5 Ctrl+S	Set Axis Ranges
Save As Interrupted M	ар	X Axis: Salinity [psu]
Zoom Z-Zoom		Maximum: 30 Maximum: 40
Auto-Zoom In Auto-Zoom Out	Ctrl++ Ctrl+-	
Move to Foreground Move to Background		Y Axis: Temperature [degrees_C] Minimum: 0 Maximum: 40
Full Range Set Ranges	Ctrl+F	
X-Variable Y-Variable Z-Variable	x Y Z	- Minimum: Maximum:
Extras	۲.	OK Car
Sample Filter Properties	► Alt+P	

4. Change display properties

- Right click on the scatter diagram > Properties > Display Style
- Change the Symbol size, Symbol color, and Line width

Redraw	F5
Save Pict As	Ctri=5
Seve As Interrupted M	ф.,
Zoom	
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Auto-Zoom In	Chil++
Auto-Zeem Out	Chier
Move to Foreground	
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Z-Variable	z
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5. Derived variables

- Go to Top Menu > View > Derived variables
- Select Potential temperature and set reference pressure as 0 db. Then click Add > OK
- Similarly select and set potential density anomaly

View	Import	Export	Tools	Help	
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1	Settings				

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Collection



6. Plot Potential Temperature vs. salinity

- **Right click on the scatter** diagram
- Change the Y-Variable to drvd:potential temperature



7. Overplot with another variable

- Right click on the scatter diagram
- Select Z-Variable as Oxygen



Other Options:

- Add isopycnals from Extras
- Save view from Menu > Save
 View As. Later Load this
 view from Menu > Load
 Views



Part 3: Section plot

Section plot:

- Select View > Layout Templates to show a list of predefined window layout templates.
- Select 1 SECTION Window.

+	2	0	Undo +	Default
			Redo	
			Station Filter Alt+S	
			Derived Variables Alt+D Isosurface Variables	
			Window Properties	
			Window Layout Alt+W	
			Layout Templates	Full Screen Map FB
			Save View As Save View Load Views Shift+L	1 STATION Window 2 STATION Windows 6 STATION Windows F9
			Browse Session Log File	1 SCATTER Window
			Settings	2 SCATTER Windows F10 6 SCATTER Windows
				1 SECTION Window
				2 SECTION Windows 3 SECTION Windows F11 5 SECTION Windows 6 SECTION Windows
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1. Define a geographic section:

- Right-click on the map, and select Manage Section > Define Section.
- Click on any point to start section. A red dot appears to mark the start point.
- Draw a line to the end point of the section and double click to end section.
- Provide Section name, choose bathymetry > File



2. Draw a Section Plot:

• Right click the section plot and select X-Variable > Section Distance. The section is displayed as coloured dots with the temperature scale bar on the right.

• Set range of X axis up to 4500 m to show the ocean floor.



3. Data interpolation/Gridding:

- Right click the section plot and select Properties
- For Data, select Reverse Range X-Axis so the view is the same as the station map.
- In Display Style, use <u>Weighted-average gridding</u>, set X scalelength to 100 and Y scale-length to 50. Uncheck Draw Marks.
- Experiment with different length scales to get desired smoothness while preserving the data structure.
- In Contours, check Do Contours and click on the icon << to create contours for the z variable

Weighted-Average Gridding for Data Interpolation

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10 - 930]

O Type here to search

- To save the settings for the section, right-click on the station map and select Manage Section > Save Section As. Accept the location and filename extension and enter the name AS_offshore_southwest. (for access later)
- To save the view of the data, select View > Save View
 As with the name India_southwest_section.

Task:

• Change the section variable to oxygen, and set ranges of the axis to view the continental shelf.

Part 3: Surface plot

Surface plots:

- Select View > Layout Templates to show a list of predefined window layout templates.
- Select 2 SURFACE Window.

Undo	•	Default		
Redo	•			
Station Filter	Alt+S			
Derived Variables Isosurface Variables	Alt+D			
Window Properties	•			
Window Layout	Alt-W			
Layout Templates		Full Screen Map	FB	
Save View As Save View Load Views	Shift+L	1 STATION Window 2 STATION Windows 6 STATION Windows	F9	
Browse Session Log	File	1 SCATTER Window		
Settings		2 SCATTER Windows	F10	
		1 SECTION Window 2 SECTION Windows 3 SECTION Windows 5 SECTION Windows 6 SECTION Windows	FII	
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1. Draw Surface Plot:

- Right click on one surface plot and select Z-Variable > Temperature.
- Right click on the other surface plot and select Z-Variable > Salinity.
- Set ranges of Z axis for temperature as 25 to 35 and salinity as 25 to 40.



2. Isosurface variables:

- Select View > Isosurface varaible
- Under New, select Temperature
 (a) Depth = enter 100 m. Click
 Add, Ok
- Right click the salinity surface plot, select Z-variable and select Temperature at depth=100
- Set ranges as same limits for both the plots, for easier comparison.





3. Data interpolation

- Again go to View > Layout Templates, select 1 SURFACE Window.
- Right click on the figure and select Z-variable as Oxygen. Set Ranges as per data variability.
- Again, click properties by right clicking, go to Display Style, select DIVA gridding.
- Uncheck Draw Marks. Check Hide Bad Estimates, Do color shading and Exclude outliers.





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- To save the view of the data, select View > Save View As with the name india_surface_oxygen.
- To save the figure select Save Plot As by right clicking, and save into desired format (.png, .jpg, .ps, .tif etc)

Task:

• Add another isosurface variable 'oxygen at depth=200 m' to see the Arabian Sea oxygen minimum zone.