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INTRODUCTION

This guide contains instructions for viewing and querying geospatial data in ArcGIS. The source of the data is Marine Digimap.

You will need access to ArcGIS software to complete this guide. No prior knowledge of ArcGIS is required. However, an understanding of the basic GIS terms such as raster and vector would be good. This information can be found in the following online learning object:

http://edina.ac.uk/digimap/support/digimapelearning/index.html

The instructions and images have been prepared using ArcGIS version 10.1.

WHAT WILL I LEARN?

- The key applications used in ArcGIS desktop software
- How to:
 - o download marine map data from Marine Digimap
 - o add raster and vector map data to ArcMap
 - o select data for an area
 - o export selected data as a Shapefile
 - o amend the symbol for a map layer
 - o label a map layer
 - o create a simple query to select map features
 - export your map as an image

WHAT DATA DO I NEED?

We cannot provide you with the data from Marine Digimap because of the conditions of the Marine Digimap licence.

Go to Marine Digimap and follow the instructions below to download the data required.

MARINE DOWNLOAD

- 1. Login to Digimap Collections.
- 2. Select Marine Digimap > Download > Marine Download.
- 3. Search for Liverpool.
- 4. Select Liverpool (Liverpool) from results.
- 5. Step 1 click **Select Visible Area.**
- 6. Step 2 tick the boxes next to:
 - a. Vector Data HydroSpatial One.
 - b. HydroView Charts 1:10000 to 1:20000 scale, as seen in this image:

Step 2. Select Data						
	Product		Allowance			
Ξv	ector Data (1 selected)					
	HydroSpatial One	Info	(4/50) tiles			
∃ HydroView Charts (1 selected)						
	Up to 1:10 000 Scale	Info	(2/30) tiles			
	1:10 000 to 1:20 000 Scale	Info	(2/30) tiles			
	1:20 000 to 1:75 000 Scale	Info	(5/30) tiles			
	1:75 000 to 1:250 000 Scale	Info	(1/10) tiles			
	Over 1:250 000 Scale	Info	No limit			

- 7. Click Add to Basket at the bottom of the screen.
- 8. Name your order and click Request Download:

Product Name	Version	Format	Layers	Options	Preview	Remove
1:10 000 to 1:20 000 Scale	February 2014	TIFF			0	Ŵ
HydroSpatial One	February 2014	SHAPE		Change	\bigcirc	Ū
					Contraction of the second	
ive this download a nan	ne:					

You will now receive 2 emails from Digimap.

- 9. Click on the link in the second email.
- 10. Tick the box to agree the data is not for navigational purposes.
- 11. Click Download.

2
•

UNZIP DATA FILES

To access the map data, you need to unzip your Digimap download file.

This step will vary depending on the software available on your computer. The following steps describe the process on a Windows desktop computer.

- 1. Open Windows Explorer or your file manager.
- 2. Navigate to the folder containing your download file.
- 3. Right click on the zip file.
- 4. Look for Extract all or Unzip.
- 5. Unzip the contents of the file to a new folder.



When you have unzipped your data, you should see two sub-folders within it, similar to the image below:

hare with 👻 Burn New folder			
^ Name	Date modified	Туре	Size
↓ hs_one_578583	12/08/2014 15:39	File folder	
hydroview_20k_578582	12/08/2014 15:39	File folder	
citations_orders_209613.txt	12/08/2014 15:38	Text Document	2 KB
contents_order_209613.txt	12/08/2014 15:39	Text Document	3 KB

- 1. Hs-one contains the HydroSpatial one vector data.
- 2. HydroView_20k contains the marine charts we will add to our map as background maps.

ADD MARINE CHARTS

The first thing we want to do is add the marine charts covering the Liverpool area to the map.

The charts you can view and download in Marine Digimap are strictly not for navigational use. They are in TIFF image format. It is straightforward to add the charts to ArcMap.

- 1. Start ArcMap.
- 2. Select New Maps > Blank map.
- 3. Click OK.

Open existing map or make new map using a template Image: Constraint of the second	Q ArcMap - Getting Started			×				
Existing Maps My Templates Browse for more My Templates My Templates Standard Page Sizes Architectural Page Blank Map North American (Traditional Layouts Blank Map World Traditional Layouts USA 9 in 12 in. 12 in X 12 in 12 in. 18 in. ARCH A Landscape ARCH A Portrait ARCH A Landscape ARCH A Portrait C: Users Wiv VapData Roaming VESRI Vpesktop 10. 1 (ArcMap) Templates (Normal.mxt Default geodatabase for this map: What is this? C: Users (Wiv Vpocuments \ArcGIS \Default.gdb V Do not show this dialog in the future. OK	Open existing map or make new ma	ap using a template						
Blank Map ISO (A) Page Siz North American Traditional Layouts Industry USA World Browse for more Blank Map Architectural Page Sizes I 2 in. X 12 in. ARCH A Landscape ARCH A Portrait ARCH B Landscape C:\Users\Viv\AppData\Roaming\ESRI\Desktop 10.1\ArcMap\Templates\Vormal.mxt Default geodatabase for this map: C:\Users\Viv\AppData\Roaming\ESRI\Desktop 10.1\ArcMap\Templates\Vormal.mxt Default geodatabase for this map: C:\Users\Viv\Documents\ArcGIS\Default.gdb OK Cancel	Existing Maps Existing Maps Existing Maps Existing Maps Existing Maps Forward Browse for more E-New Maps Forward Maps F	My Templates						
ARCH A Landscape ARCH A Portrait ARCH B Landscape ARCH A Landscape ARCH A Portrait ARCH B Landscape C:\Users\Viv\AppData\Roaming\ESRI\Desktop10.1\ArcMap\Templates\Normal.mxt Default geodatabase for this map: C:\Users\Viv\Documents\ArcGIS\Default.gdb Do not show this dialog in the future. OK Cancel	USA 	Blank Map Architectural Page Sizes	9 in. x 12 in.	▲ 12 in. x 18 in.				
C: \Users \Viv \AppData \Roaming \ESRI \Desktop 10. 1 \ArcMap \Templates \Vormal.mxt Default geodatabase for this map: C: \Users \Viv \Documents \ArcGIS \Default.gdb C: \Users \Viv \Documents \ArcGIS \Default.gdb OK Cancel	4 III >	ARCH A Landscape	ARCH A Portrait	ARCH B Landscape				
Default geodatabase for this map: What is this? C: \Users \\Viv \Documents \ArcGIS \Default.gdb Do not show this dialog in the future. OK Cancel	C:\Users\Viv\AppData\Roaming\E	SRI\Desktop10.1\ArcMap\Templates\	Wormal.mxt					
C: \Users \Viv \Documents \ArcGIS \Default.gdb C: \Users \Viv \Documents \ArcGIS \Default.gdb OK Cancel	Default geodatabase for this map: What is this?							
Do not show this dialog in the future. OK Cancel	C:\Users\Viv\Documents\ArcGIS\Default.gdb							

4. Select Add Data.



- 5. Navigate to the folder with your charts, i.e. the **hydroview_20k** folder.
- 6. Note: you may have to make a connection to the download folder. ArcGIS does not automatically recognise folders. If you cannot see your folder in the list, click the Connect to Folder button (yellow folder with a plus sign on it), then navigate to the download folder:

Add Data			x
Look in:	older Connections 🔹 🛧 🏠 🗔 🛛 🖛 🗸	2	ei ti 🗞
🔚 C:\Program	Files		Connect To Folder
🔚 C:\Users\Viv	\Desktop		
🔚 E:\			
🔚 E:\leeds digi	map essentials		
E:\Wind Far	ns		
🔚 H:\viv			
Z:\Geo\PRE	SENTATIONS\Glas_MSc_Workshop		
Z:\Geo\PRE	SENTATIONS\Glas_MSc_Workshop\2013\Final Data		
Z:\User Sup	port\Training		
			II
Name:		1	Add
Show of type:	Datasets, Layers and Results 🔹 🔻		Cancel

- 7. Select the 2 .tif files from the HydroView folder.
- 8. Click Add.

Add Data	
Look in:	hydroview_20k_578582 🔹 🛧 🏠 🎲 🐨 🖬 🔁 🗊 🚳
3490-1_w.t 3490-1_w.t 3490-2_w.t 3490-2_w.t 3490-2_w.t marine_co	if xt xt nditions.txt
Name:	3490-1_w.tif; 3490-2_w.tif Add
Show of type:	Datasets, Layers and Results Cancel

If this is the first time these tiff files have been opened ArcMap may ask if you want to build Pyramids for them.

9. Click Yes when asked if you want to build pyramids, you will need to do this for each tiff file you add.

The tiff files will open up and look like the following map:



10. Use the Zoom and Pan tools to explore the maps.

File	Edit	View	Bookmarks	Insert
:	2	819). 🖻 🛍 🗙	50
•	🔍 🔊	3 🕻	K 23 < 🔿	× 2 -

11. Save your ArcMap project with a meaningful name.

CHECK MAP PROJECTIONS

Before we add more data to our project, we should decide in which geographic projection you want to display the data¹. Once we have added one data set to the project, any subsequent data sets that we add to that project will be converted by ArcMap to be in the same projection.

The projections of the marine charts from Marine Download vary. The larger scale (more detailed) charts are in Transverse Mercator projection. All of the Hydrospatial vector data is in WGS84 projection.

To check the projection of our charts:

- 1. Right click on **3490-1_w.tif**, in the Table of Contents.
- 2. Select Properties.
- 3. Click on the Source tab.
- 4. Scroll down until you see Spatial Reference we can see that our projection is WGS_1984_Transverse_Mercator.

ayer Properties	Carrow - a matter was	
General Source Key Metadata E	ixtent Display Symbology	
Property	Value	*
Right	2900.29944123	
Bottom	5916013.01573	
Spatial Reference	WGS_1984_Transverse_Mercator	
Linear Unit	Meter (1.000000)	
Angular Onic	Degree (0.017-552525155)	E
false_easting	0	
false_northing	0	
central_meridian	-3.0216666666666667	
scale_factor	1	-

Our charts are in the same projection as the Hydrospatial data that we are about to add, so we do not need to edit it.

¹ To learn about map projections, have a look at the Digimap elearning modules:

http://wyvis.edina.ac.uk/webhelp/training/training.htm#elearning/eLearning.htm

NOTE ON PROJECTION:

1. If you try to add data with a different projection than the existing layer(s), ArcMap may warn you and give you the opportunity to transform the projection:

Geographic Coordinate System	ns Warning
The following data sources use the one used by the data frame	a geographic coordinate system that is different from e you are adding the data into:
Data Source	Geographic Coordinate System
nw25400040.asc	GCS_WGS_1984
Alignment and accuracy problem between geographic coordinate	ns may arise unless there is a correct transformation e systems.
You can use this button to spec transformation(s) used by this o	ify or modify the Transformations

If you were working with Ordnance Survey data, you may want to display your map data in British National Grid.

The most accurate transformation between WGS_1984 and British National Grid is OSGB_1936_To_WGS_1984_Petroleum.

Geographic Coordinate System Transformations	L X
Convert from:	
GCS_North_American_1927 GCS_North_American_1983 GCS_OSGB_1936	ОК
GCS_WGS_1984	Cancel
Into:	
GCS_OSGB_1936	Add
Using (choices are sorted by suitability for the layer's extent):	
OSGB_1936_To_WGS_1984_Petroleum ▼	New
Method: Position Vector - dx=446.448000 dy=-125.157000 dz= rx=0.150000 ry=0.247000 rz=0.842000 s=-20.489000	542.060000)
About geographic transformations	

IMPORT HYDROSPATIAL ONE DATA

This is vector map data, downloaded from the Marine Download service in Marine Digimap.

The data is in Shapefile format, which is an ESRI format and compatible with ArcMap.

There is a Shapefile for each different theme. We only want to add one of the themes, Wrecks point.

- 1. Click on the File menu and Select Add Data, or click the Add data icon.
- 2. Navigate to the download file.
- 3. Click the sub-folder hs_one.
- 4. Click one of the sub-folders, that start with NW.
- 5. Select the file ending in WRECKS_point.shp. You may need to scroll to find the file.



- 6. Click Add.
- 7. Repeat this step for the remaining 3 sub-folders.

NOTE that the 4 sub-folders each represent a different map tile – the area you selected covered 4 marine map tiles.

Your map window should look similar to this:



SELECT WRECKS FOR OUR AREA

Our wrecks data covers a large area. We can select wrecks for a small area and export the selection, so that we can use it again.

- 1. First, zoom in so that you can see the charts clearly.
- 2. Now click Select > Select by Rectangle.

1	- 🖸 🔈 🔊 🖉	= 🔜 🕅 💥 🖓 📄 📮
12	Select by Rectangle	
	Select by Polygon	•
	Select by Lasso	Select Features
	Select by Circle	Select features from selectable
2₩3	Select by Line	layers by clicking on them or dragging a box over them. Hold down SHIFT while selecting
		features to add them to the selected set or remove them from it, or choose Selection >
		Interactive Selection Method.
		Press F1 for more help.

- 3. Click and drag on the map, to draw a box that covers both marine charts.
- 4. You should see the wrecks within the rectangle highlighted on the map.



Now let's create a new map layer from the selected data.

5. First, click the List by Selection tool at the top of the Table of Contents – it's an arrow:



You should see something similar to that shown in the image below – in this example, 2 of our WRECKS layers are listed under Selected (they have points within our rectangle) and 2 of the wrecks layers are Selectable (no points within the rectangle):

Table Of Contents		ά×
🐮 📮 📚 📮 🗉		
Selected		
SZSO_WRECKS_point	🗹 🕅 146	
SZSO_WRECKS_point	🔽 🖸 113	er beschlatt der bes
 Selectable (no features selected) 		
SZSO_WRECKS_point	M 🛛 0	
SZSO_WRECKS_point	M O	
Not Selectable		
3490-1_w.tif		
3490-2_w.tif		

- 7. Now we want to save the selected features as new map layers.
- 8. Right click one of the Selected layers in the Table of Contents.

9. Select Create Layer from selected features.

10. Repeat for the other layer:

Table Of Contents		Ψ×	*
%: 📮 🗇 📮 🗄			• •
Selected			• •
SZSO_WRECKS_point	M M 146		•
SZSO_WRECKS_point	🗹 🖸 113		Open Attribute Table
 Selectable (no features selected) 		⊕	Zoom To Selected Features
SZSO_WRECKS_point	0 🗹 🗹	200	Pan To Selected Features
SZSO_WRECKS_point	0 🖂 🖸		Clear Selected Features
Not Selectable		5	Switch Selection
♦ 3490-1_w.tif			Select All
♦ 3490-2_w.tif			Make This The Only Selectable Layer
			Copy Records For Selected Features
			Annotate Selected Features
			Create Layer From Selected Features
			Open Table Showing Selected Features

11. Now click the List by Drawing Order button on the Table of Contents:

Table Of Contents	
😒 🔍 😂 I 📰	
	_
List By Drawing Order	on 2
Layers are listed by drawing order. Drag and drop to change drawing order. Right-click layers for more commands. Click a symbol to change it.	on
SZSO_WRECKS_point	

12. You should see that 2 new layers have been added to your Table of Contents.



13. To save these for future use, right click on one at a time and select **Data > Export Data**.

	Data	•	Repair Data Source	7 <i>1</i>
\diamond	Save As Layer File	Q	Export Data	
₽	Create Layer Package		Export To CAD	
8	Properties		Make Permane	
_			View Item Dese Save this layer's or geodatabase	data as a shapefile feature class
		62	Review/Remater Auguresses	
		-		_

14. Click on the yellow folder icon and select an appropriate folder to save the new file:

Export Dat	a	×
Export:	All features	•
Use the s	ame coordinate system as:	
this lat	yer's source data	
🔘 the da	ta frame	
the fe (only a)	ature dataset you export the data into applies if you export to a feature dataset in a geodatabase)	
Output fe	ature dass:	
C:\Usen	s\Viv\Documents\ArcGIS\Default.gdb\Export_Output	2
		Brow
		_
	OK Cance	

- 15. Give the file a meaningful name.
- 16. Select to save the new file as a Shapefile.
- 17. Click Save.

Saving Data		3
Look in:	hs_one_578583 🔹 🛧 🏠 🖓 🖓 🗰 🕶 😂	
C nw5530003(nw5530003) nw5535003(nw5535003)	0 5 10 15	
Name: Save as type:	wrecks_selection1 shp Save Shapefile Cancel	

- 18. Say yes to adding the data to your map as a new layer.
- 19. Repeat the Export Data steps for the other wrecks selection layer.
- 20. Now, one at a time, right click and remove the other wreck layers from your Table of Contents. You should end up with the 2 new wrecks layers plus the charts in your table of contents.



CHANGE WRECK SYMBOL

You can quickly change the symbol used for the wreck points, to make them more visible.

1. Click one of the symbols in the Table of Contents, under the layer name:



- 2. The Symbol Selector box will appear. Select a different symbol and colour, e.g. we have chosen a red pin symbol, at a size of 14. You can also type **wreck** in the search box and see what other symbols are available.
- 3. Click OK.
- 4. Repeat for other wrecks layer.

Type here to search	▼ 🔍 🔬 🗄 🗣 Current Symbol
Search: 💿 All Styles	Referenced Styles
ESRI	X
• •	
Circle 1 Square 1 Ti	riangle 1 Color:
• •	Size:
Pentagon 1 Hexagon 1 O	Angle: 0.00
• •	Edit Symbol
Rnd Square 1 Circle 2 S	Square 2
	•
Triangle 2 Pentagon 2 He	exagon 2
	Style References

LABEL THE WRECKS

- 1. Right click one of the Wrecks layers in the Table of Contents.
- 2. Select Properties.
- 3. Select the Labels tab.
- 4. Select Label features in this layer.
- 5. Select SZLABEL as the label field.
- 6. Set a font size of 8.

Layer Properties
General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Time HTML Popup
Label features in this layer
Method: Label all the features the same way.
All features will be labeled using the options specified.
Text String
Label Field: SZLABEL
Text Symbol
ABc Arial V 8 V B I U Symbol
Other Options Pre-defined Label Style
Placement Properties Scale Range Label Styles
OK Cancel Apply

If you wish, you can apply a halo so that your labels are more clearly visible:

7. To do this, click Symbol on the properties tab:

Layer Properties	? ×
General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates	Time HTML Popup
Label features in this layer	
Method: Label all the features the same way.	
All features will be labeled using the options specified.	
Text String	
Label Field: SZLABEL	
Text Symbol	
ABc ABc ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	
Other Options Pre-defined Label Style	
Placement Properties Scale Range Label Styles	
ОКСС	ancel Apply

8. Click Edit Symbol .



- 9. Click the Mask tab and select the Halo button.
- 10. Click OK.
- 11. Click OK twice more.

Editor Preview AaBbYyZz	Properties: Type: Text Symbol Units: Points General Formatted Text Advanced Text Mask Style: None Halo Size: 2.0000 Size: Symbol
XX 23 III 100% V	OK Cancel

You should be able to zoom in and see labelled wreck points, as shown in this image:



EXPLORE THE HYDROSPATIAL ONE DATA

If you want to find out more about the wrecks, you can try a couple of things.

1. Right click one of the wrecks layers and select Open Attribute Table:

Table Of Contents	Ψ×	
😒 🤤 🥪 🖳 🗄		
🖃 <i> Eayers</i>		
 □ ✓ wrecks_selection ○ ○ wrecks_selection × 	Copy Remove	
 ♦ ♦ 3490-1_w.tif ● 3490-2_w.tif 	Open Attribute Table Joins and Relates Zoom To Layer	•

2. If you scroll right in the table, you will find a field **DATSNK**, which tells you the date of sinking:

ATLST	DATSNK	DEBRIS	
75	26/07/1899		
76	29/08/1873		
	11/01/1951		
80	05/02/1891		
75	01/04/1896		
	16/08/1977		
55	??/09/1895		
	23/08/1898		
78	10/12/1977		
94	22/12/1894		
	29/06/1920		
86	30/04/1898		
	08/10/1897		
	??/??/1923		
	14/09/1881		

3. Close the attribute table.

You can also click on individual wreck points to generate information.

4. Click on the Identify tool:

ert	Selection	Geoprocessing	Customize	Windows
C	1 🗢 🕂	12,500	-	🖽 調 🖥
¥ -		1) / 🕫 🔛 🛛	🗛 🛍 👷	
		Identify		
		Identify geographic features by clicking on them or dragging a box around them.		
poin	t			Se .

5. Then click on any wreck point on your map – a box with information is generated. Note that this information is the same fields as those you viewed in the attribute table:

			ШĽ
Location:	-5,538.770 5,924,122.546 Meters		₹
Field	Value		•
FID	478		
Shape	Point		Ξ
SZLABEL	DUNVEGAN CASTLE		
SZFEATURE	WRECKS		
SZFEATCODE	15902		
SZFEATDESC	Wreck, dangerous wreck		
SZLEVEL	7		
SZSOURCE	UKHO Wrecks & Obstructions		
SZDATASET	70637		
SZID	637000001079431		
SZGEO	P		
SZSCALE	0		
SZAPPENDED	22/04/2010		
SZPUBLISH	30/03/2010		
SZUPDATED	29/09/2010		
CATWRK	dangerous wreck		
CLASSE	Unclassified		Ŧ
•	III	•	

Identified 1 feature

QUERY ATTRIBUTE DATA

You can select different map features by querying your attribute data. Let's try and select some wrecks that are visible when the water level changes.

- 1. Right-click one of your wrecks layers.
- 2. Select Open Attribute table.
- 3. Click Select by Attributes from the drop down at the left.



- 4. Double click WATLEV.
- 5. Click the equal sign =
- 6. Now click Get Unique Values this will pull all possible values from the field WATLEV into that box.
- 7. Double click 'covers and uncovers' to add this to the query.
- 8. Finally click Apply.

If you scroll to the far right of the attribute table and scroll down, you should see any incidence of the field 'covers and uncovers' highlighted in blue, similar to the image below:

_				
	VERLEN	WATLEV	SCAMIN	NINFO
	0	covers and uncovers	0	
	0	covers and uncovers	0	
	0	covers and uncovers	0	
	0	covers and uncovers	0	
	1.2	covers and uncovers	0	
	0	covers and uncovers	0	
	0		0	
	0		0	

- 9. Close the Attribute table.
- 10. You should see the selected wrecks highlighted in blue on your map, similar to the image below.
- 11. You could export the selected records if you chose to, using the Data > Export Data function.



EXPORT YOUR MAP

You can print your map directly from ArcMap, but you may wish to export it in order to have an image that you can use in other documents.

NOTE: There are two possible views in ArcMap – Data view or Layout View. You can switch between views at the bottom left of the map display area, using the icons:



- Data View in this view you add map data and do any map analysis.
- Layout View in this view you can prepare a map for printing, for example by adding a title, scale bar, north arrow etc, using the Insert menu.



You can export your map in either view.

- 1. Click File > Export.
- 2. Select to save your file in a suitable folder.
- 3. Give your file a name.
- 4. Select the file type in this image we have chosen JPG.

- 5. Select a resolution.
- 6. Tick Write World File this will create world files, that contain the geographic coordinates of your map. If you wish to use your exported file in GIS, you will need these.
- 7. Click Save.

Q Export Map				×	
Save in:	Save in: 🌗 Wrecks exercise ArcGIS 🔹 🔹 🚱 🔊			-	
Ca.	Name	*	Date modified	Туре	
Recent Places		_250000+raster+liverpool_117154	05/11/2013 12:23 19/04/2013 12:15	File folder File folder	
	Harbour cha	Harbour charts Liverpool		File folder	
Desktop	Hydrospatia style	\mu Hydrospatial Liverpool 🔐 style		File folder File folder	
Libraries	퉬 Wind Farms	GB operational	19/04/2013 12:15	File folder	
Computer					
Network	File name:	Wrecks Liverpool ing		Save	
File name: Save as type: - ▽ Options General Format		JPEG (*.jpg) Cance EMF (*.emf) PDF (*.eps) AI (*.ai) PDF (*.pdf)		Cancel	
Resolution:	150	SVG (*.svg) BMP (*.bmp)			
Width:	2306	PNG (*.png) TIFF (*.tif)			
Height:	1553	GIF (*.gif)			
✓ Write World File					
	_			H	

You should now have a map image that you can use in a document, or use as part of another GIS project.