

After cleaning data in MBSystems, run mbprocess in the day folder you have been working in.

To build the “first cut grid” (ZTopo.grd) for the day file only:

1. Open a new terminal window; navigate to the day folder you just cleaned.
 - a. i.e. /Volumes/MappingAUVOps2009/20090717
2. Type nedit process.cmd , this will open a command file. In the command file find the code that looks like
Generate first cut grid
mbgrid -I datalistp.mb-1 -A2 -E2/2 -C4 -F5 -N -O ZTopo -V
mbgrdviz -I ZTopo.grd &
3. Copy and paste (select in process.cmd and click the center button to paste) this code into the window that is finished running mbprocess.
4. This should build a grid called ZTopo.grd in the day folder and it should automatically open in mbgrdviz.
5. Review the grid to determine if it is clean enough to make a compiled grid from multiple days.

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To build “Figure” grids

1. In a new terminal window navigate to the appropriate Figures folder (/Volumes/MappingAUVOps2009/NorthernExpedition/Barkley/Figures).
2. Run the code that builds the grids you are interested in re-running, say after you do more data cleaning and after running mbprocess in the day folder. The code will look like :

```
# Generate 1 m bathymetry grid of each survey
mbgrid -I ../../20090722/datalistp.mb-1 \
-R-126.0865/-126.0325/48.2970/48.3515 \
-A2 -E1/0! -C10 -F5 -N \
-O BarkleyCanyon_1_MAUV_Topo_1m -V
mbgrdviz -I BarkleyCanyon_1_MAUV_Topo_1m.grd &
```

- A2 causes bathymetry data to be gridded as topography, with positive values up (don't change)
- N sets no data as NaN (required by GMT, don't change)
- C2 calls for a spline interpolation to be used to fill gaps in data that are up to 2 grid cells big. You can change this however you like, or delete it.
- F5 sets the gridding algorithm (don't change)
- V causes the command to run in the verbose mode (don't change)
- O names the output file

Optional command -R

-R west/east/south/north can be used to specify the region you want gridded. Enter data in decimal degrees or with a colon separating degrees and decimal minutes.

i.e. -R-122:6.154/-122:5.407/36:41.883/36:42.174

3. Grid should automatically open in mbgrdviz

*****F.Y.I.*****

MBSystems NOTE: When navigating to Volumes you can skip the initial `cd .. cd ..` by typing `cd /Volumes`

MBSystems NOTE: To get to your desktop you need to type `cd /Users/auvmapping/desktop`. If you start with that forward slash it doesn't matter where you start, there is no need to `cd ..` up to the highest level.

MBSystems NOTE: In order to turn a grid into an ascii file and bring it into Arc GIS (instructions below) you have to make sure the grid is square. To do this you must run the code with the argument `-E1/0!` (for a 1 m grid) `-E2/0!` (for a 2 m grid) etc.

MBSystems NOTE: if you add any lines to the code finish the line with a space followed by a `\`. This indicates the code continues on the next line. Be careful though, you don't want a "space `\`" on the last line above `mbgrdviz` or above code ending in `.cmd`.

YES

```
mbgrid -Idatalist_soquelp.mb-1 \  
-O SoquelCanyonMAUVTopo \  
-F5 -N -A2 -E1/0! -C5 -V \  
mbgrdviz -I SoquelCanyonMAUVTopo.grd &  
  
mbm_grdtiff -I SouthernHydrateRidgeTopo1m.grd \  
-G5 -D0/1 -V -O SouthernHydrateRidgeTopo1m \  
SouthernHydrateRidgeTopo1m_tiff.cmd
```

NO

```
mbgrid -Idatalist_soquelp.mb-1 \  
-O SoquelCanyonMAUVTopo \  
-F5 -N -A2 -E1/0! -C5 -V \  
mbgrdviz -I SoquelCanyonMAUVTopo.grd &  
  
mbm_grdtiff -I SouthernHydrateRidgeTopo1m.grd \  
-G5 -D0/1 -V -O SouthernHydrateRidgeTopo1m \  
SouthernHydrateRidgeTopo1m_tiff.cmd
```

Arc GIS Raster NOTE: ArcGIS calls all square gridded data rasters, they can contain vertical data (grids or DEM's) or they can be georeferenced images with no vertical data (images, geo tiffs or georeferenced tiff images).

Arc Catalog NOTE: If you are having trouble finding a file in ARC GIS you can open Arc Catalog (looks like a little yellow file cabinet). Navigate to the folder where your file is and click on the file in question. In the window to the right choose the "preview" tab to see what the file looks like. If it looks good you can click on the file in the left-hand side window and drag the file into ARC Map. You may need to refresh the folder in order to see what is actually in it. You have to select the folder in the left-hand window and go to View – Refresh. This only works for the folder that is selected.

Arc GIS Markpoint NOTE: In order to get the markpoints off the ship before you leave find the shapefiles created for each "day" in Lava/Documents and Settings/DocRicketts. Copy all the files associated with your cruise days onto your laptop or an external drive. There are 7 separate files for each shapefile.

Arc GIS Attribute Table (dbf) NOTE: If you want to view a table of your data you can open the .dbf file in Microsoft excel. Make sure the shapefile isn't in an open Arc project. Do not alter or save the dbf file, this will corrupt the shapefile. Close the dbf immediately after copying out your data.

To build a compiled grid referencing multiple days of mapping:

1. In a new terminal window navigate to the appropriate Figures folder (/Volumes/MappingAUVOps2009/NorthernExpedition/BarlekyCanyon/Figures).
2. Check the datalist file to see what days are referenced, type nedit
mbdatalist_XXXXX.mb-1
 - a. Usually when a datalist references multiple days in a Figures folder the datalist has a more specific name such as datalist_soquel.mb-1. Sometimes Dave will make a datalist in the Figures folder called datalist.mb-1.
3. Add any missing days to the datalist file and include a -1, this indicates the format is "datalist" i.e.

```
/Volumes/MappingAUVOps2009/20080428/datalist.mb-1 -1  
/Volumes/MappingAUVOps2009/20080429/datalist.mb-1 -1  
/Volumes/MappingAUVOps2009/20080723/datalist.mb-1 -1  
/Volumes/MappingAUVOps2009/20090305/datalist.mb-1 -1
```

```
/Volumes/MappingAUVOps2009/20090310/datalist.mb-1 -1  
/Volumes/MappingAUVOps2009/20090624/datalist.mb-1 -1
```

Save and close the datalist.

4. Open the file called Figure.cmd in the Figures folder, type nedit Figures.cmd
5. Find the code that builds the grid you want, i.e.

```
mbgrid -Idatalist_soquelp.mb-1 \  
-O SoquelCanyonMAUVTopo \  
-F5 -N -A2 -E1/0! -C5 -V  
mbgrdviz -I SoquelCanyonMAUVTopo.grd &
```

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To make a geo tiff (georeferenced image with no vertical data) that can be brought into ArcGIS:

1. Make sure you are in the appropriate MBSystems “Figures” folder
(/Volumes/MappingAUVOps2009/NorthernExpedition/BarkleyCanyon/Figures)
and open the Figure.cmd file by typing nedit Figure.cmd. Find the code beginning with mbm_grdtiff that references the grid you want to bring into Arc GIS and copy and past it into the appropriate terminal window. It should look something like:

```
# Topo slope maps  
mbm_grdtiff -I BarkleyCanyon_1_MAUV_Topo_1m.grd \  
-O BarkleyCanyon_1_MAUV_Topo_1m_Slope_MapE \  
-G5 -D0/1 -A1 -V
```

-G5 results in a color or grey fill grid shaded by slope magnitude
-D0/1 will flip the shading convention but leave the default color convention (a nice look)
-V causes the command to run in the verbose mode (don’t change)
-A1 sets the magnitude of the shading, values range between 0.1 and 10 (feel free to change or delete) If you delete the default is 0.2

Optional Commands

-Z -2300/0 results in a geo tiff with color ranging from -2300 to 0 m depth
Set the depth range to make geotiffs compatible with other geotiffs (good for layering geotiffs in ArcGIS) or to highlight areas of importance.
-S1 enables effective historgarm equalization of the color (good for capturing details but not good for layering grids in Arc GIS because no two will come out with the same color scheme)
-S1/1 enables effective historgarm equalization of the color and shading (don’t usually use this option but may be handy to see small scale features)

2. Now copy the .tiff file just created in
Volumes/ExternalDrive/MappingAUVOps2009/NorthernExpedition/Figures to
your GIS directory (Lava/GIS_Data/Pacific Northwest/images/geo)

!!!!!!!!!!!!!!VERY IMPORTANT NOTE ABOUT TIFS (Images)!!!!!!!!!!!!!!:

Remember you make the tiff in the MBSystems directory and then copy it into the GIS directory (Images not grids). If a geotiff already exists in your GIS directory you must **first remove the geotiff from any open Arc GIS project then erase the old geotiff and the associated files** in GIS_Data/Pacific Northwest/images/geo. If you don't erase all the ancillary files Arc GIS won't show the new file. For some reason it shows the old, dated file in your map.... Then you can paste in the new tiff (only one file) into GIS_Data/Pacific Northwest/images/geo.

3. Open Arc GIS and add the new tiff file to the map (if it asks, allow it to build pyramids, this speeds up the refresh rate and is the process that creates all the ancillary files).
4. To make white background transparent right click on the new tiff in ARC Map table of contents and choose "Properties." Go to the "Symbology" tab
 - a. Check the box next to "Display Background Value: (R,G,B)" and replace the three 0's with three 255's, click OK.

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To make a grid (georeferenced raster with vertical data embedded in each raster cell) for Arc GIS

1. First you need to make an ascii file in MBSystems using the code in Figures.cmd
It should look like:
mbm_grd2Arc -I SouthernHydrateRidgeTopo1m.grd \
-V-O SouthernHydrateRidgeTopo1m.asc
2. Now move/copy the ascii file you just created from where you're working in MBSystems to your GIS directory. For the Pacific Northwest the file should be in GIS_Data/Pacific Northwest/grids/geo
3. Open ArcGIS (you can open a blank map or the map you want to work in)
4. Open the toolbox (little red toolbox icon on the top
 - a. Click on the little plus next to "Conversion Tools"
 - b. Click on the little plus next to "To Raster"

- c. double click ASCII to Raster
5. Under “Input ASCII raster file” click on the folder and navigate to the newly created .asc file in the ArcGIS directory. Make sure the file type selected is .ASC and select the file you want to convert.
6. Click on the folder next to “Output raster” and save the new raster in the same location (GIS_Data/Pacific Northwest/grids/geo), make sure the new raster name is appropriate. I usually try to name rasters by the same name used in MBSystems so we can tell where the grid comes from. BUT you can only use 13 characters so you may have to abbreviate. You may want to add grid resolution to the name (i.e. 2m) if it isn’t already.
7. Choose Floating for the “Output data type”. This preserves all decimal data. An integer raster will only have whole numbered values for the vertical data. This is appropriate if you are making a raster of categorical not continuous data.
8. Hit OK, the grid should be automatically added to the map
9. To adjust the display, right click on the new grid and choose properties. Choose the “Symbology” tab and choose a color ramp that represents the grid well (White to Orange to Blue is pretty standard).
10. If you want to flip the color scheme there is a box you can check called “Invert”
11. If you want to adjust the min and max depth scroll down and next to Statistics choose “From Custom Settings (below)” and change the min and max to your preferred values.