Shapefiles

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Background

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Exercise 2: Load geological province shapefiles in GPlates

Background

This tutorial describes some common tasks related to managing shapefiles that can be carried out in GPlates. Shapefiles can be viewed natively in GPlates without having to perform any file conversions (assuming they conform to shapefile standards). GPlates will also export shapefiles for use in other GIS platforms (such as ArcGIS). Additionally GPlates is capable of converting legacy PLATES4-formatted files into the shapefile format, as well as GPlates GPMLz and GMT xy.

Important:

(1) Shapefiles are actually a collection of linked files. All these files must be located in the same directory as the .shp file that is being loaded in GPlates. The file extensions include: .sbx, .dbf, .prj, .sbn, .shx. When using GPlates only the file with the .shp extension is loaded, the rest are automatically referenced by the program, but will not have to be opened or read by you the user.

(2) When you create shapefiles in GPlates, GPlates will automatically generate the necessary ancillary files.

(3) Only rename shapefiles in your GIS editor, including GPlates (i.e. do not rename the .shp file in your Finder/My Computer etc).

Note: The shapefiles associated with this tutorial are in a WGS 84 geographic datum. If you are working in another projection within ArcGIS, you may need to apply a geographic transformation to the data. This is reasonably straight-forward and automatic in most GIS packages. Refer to the manual of your GIS package for more information.

Included Files

<u>Click here</u> to download the data bundle for this tutorial.

The data bundle should include the following GPlates files:

Seton_etal_ESR2012_Coastlines_2012.1_Polygon.gpmlz

Seton_etal_ESR2012_2012.1.rot

The data bundle should also include the following shapefiles:

EuclaBasin

GPlates_Coastline

MarionTerrain

QLD_Plateau

This tutorial dataset is compatible with GPlates 1.5.

Exercise 1: Exporting GPlates files to shapefiles for use in GIS packages such as ArcGIS

1. Open GPlates

2. The sample GPlates data is contained in the data bundle for this tutorial.

In GPlates, navigate to File \rightarrow Manage Feature Collections \rightarrow Open File...

3. Navigate to the sample data directory, and select the coastline file i.e. "Seton_etal_ESR2012_Coastlines_2012.1_Polygon.gpmlz" (Figure 1) \rightarrow Open



Figure 1. Loading feature data into GPlates.

4. Coastlines are now displayed in GPlates. To export these data in the shapefile format, open the 'Manage Features Collection' window again. Next

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to the filename, click the 'Save a copy of the file with a different name' button (Figure 2).

G GPlates		
File Edit View F	Features Reconstruction Utilities Tools Window Help	
		Current Feature Type:
		Name:
643	12 Manage Feature Collections	
17/	Manage the feature collections which are loaded in the application.	from to
	File Name File Format A	ctions Clicked geometry:
200	1 Seton_etal_ESR2012_Coastlines_2012.1_Polygon.gpmlz Compressed GPML	Feature collection:
	Save a Copy Make a copy of the file with a different name, but continue working with the original. This is ideal for making backup copies as you work. Open File Save All Changes Save Selected Unload Selected Close	
	View: 3D Orthographic 🔹 100% 🚔 (lat: 6.36 ; lon: 12.59) Mouse: (lat: 3.36 ; lon: -)	77.78) (off globe)
	X Clicked Topology Sections	
	Feature type Plate ID Name Clicked geometry Begin End Created Present-day g	eometry (lat ; lon)

Figure 2. There are different options for saving files under the Actions tab in the Manage Feature Collections window. In this exercise we are using the option to save a copy of our data with a different name.

5. Specify the name of the output shapefile as "GPlates_Coastline", and select the 'ESRI shapefile (*.shp)' file type (Figure 3). Click 'Save' to complete export. GPlates exports the geometry with the accompanying attribute information such as Plate ID, Name, etc. This means that this shapefile can be directly loaded in GPlates again.



Figure 3. The 'Format' drop down box enables you to choose which format you would like your data to be saved in; .shp in this case.

Exercise 2: Load geological province shapefiles in GPlates

1. File \rightarrow Manage Feature Collections \rightarrow Open File...

Navigate to where you have saved sample data for this tutorial, select the four geological province shapefiles (CarpentariaBasin.shp, EuclaBasin.shp, MarionTerrain.shp and QLD_Plateau.shp) and click `Open'.

The first time you load a shapefile in GPlates, you will be prompted to assign the shapefile fields that correspond to the GPlates model properties. For our purposes, ensure that Plate ID and Name match the corresponding shapefile fields of the same titles, by making the necessary selections from the drop-down lists (Figures 4 and 5). Click 'OK' and repeat this process for the other geological provinces.

Note: Warning messages regarding unknown feature types may appear upon loading, but these can be ignored. This is because we have not assigned Feature Types in this exercise.

G GPlates	🛃 Map File Attributes	8
File Edit View Features Reconstruction Utilities Tools Window Help	Associate file attributes v	with GPlates model properties.
	Filename: CarpentariaBasin.shp	
	Model property	File attribute
	Plate ID:	PlateID 🔹
1 💥 🔰 🖉 🗸 🗸	Feature Type:	TYPE
	Begin:	<none></none>
	End:	<none></none>
	Name:	NAME
	Description:	<none></none>
	Feature ID:	<none></none>
	Conjugate Plate ID:	<none></none>
	Reconstruction Method:	<none></none>
	Half-stage left plate:	<none></none>
	Half-stage right plate:	<none></none>
	Spreading Asymmetry:	<none></none>
View: 3D Orthographic 🔹 100% 🚔 (lat: 6.36 ; lon: 12.59)		
× Clicked Topology Sections		
Feature type Plate ID Name Clicked geometry Begin E		
	Reset	OK Cancel

Figure 4. Selecting the shapefile attribute that corresponds to each GPlates geometry.

G GPlates	Map File Attributes	
File Edit View Features Reconstruction Utilities Tools Window Help Time: 0.00 Ma	Associate file attributes with GPlates model properties. Filename: EuclaBasin.shp	
View: 3D Orthographic 100% (at: 6.36; lon: 12.59) Clicked Topology Sections Feature type Plate ID Name Clicked geometry Begin E	Hodel property File attribute Plate ID: ENDO PET Feature Type: MATR_OIL MATR_GAS Matr_NOL Begin: MATR_PET End: FUTR_GAS Name: FUTR_GAS PUTR_GAS Image: Composition of the state	
	Keset OK Cancel	

Figure 5. Use the drop down boxes to make sure that the GPlates Plate ID and Name fields match the correct shapefile attributes.

If by accident you choose the wrong shapefile attribute, you can reopen the 'Associate shapefile attributes with GPlates model properties' window at any

time by using the 'Configure' button _____, under Actions, in the Manage Feature Collections window.

2. File \rightarrow Manage Feature Collections \rightarrow select the coastline and rotation files from the GPlates data bundle folder (the coastline file will already be loaded if you are continuing on from the last exercise) \rightarrow Open \rightarrow now close the Manage Feature Collections screen to return to the main globe view.

The coastline and rotation files are now loaded. Use the animation tools to reconstruct your data. You will notice that the four geological provinces will move with the Australian plate (as they share the same plate ID). In Figure 6, screen-shots from GPlates are taken at present day (0 Ma) and 20 Ma.



Figure 6. View of the Australian region showing that the basins are moving fixed to Australia at 0 and 20 Ma.