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Exercise 4

Creating Tile Packages (TPKs) from GTAC Image Services for Mobile Use

Introduction

With mobile data collection becoming the norm, there is a need for people to have maps and imagery on their mobile devices as they head out into the field. The GTAC Image Services, as well as other ArcGIS Servers, provide a wealth of imagery, maps, and other data that you can use while performing your field work. Using tools available in ArcGIS, this guide will walk you through the steps to create Tile Packages (.tpk) that can be used in conjunction with Collector on your mobile device.

These instructions presume that you already have a project folder in which you will save the data, and have write permission to that folder. You should also have an Area of Interest delineated in a polygon feature class (not a shapefile); the larger your polygon is, the more disk space you will need to store, and the longer it will take to create, your Tile Package. The final size will vary depending on the resolution of the original service, number of bands, delineated area, etc. These steps are adapted from steps created by Ian Broad. Note: This has not been fully tested with ArcGIS v10.5

Prerequisites

- ArcMap on your desktop or on Citrix.
- A polygon feature class of your area of interest; this should be a single polygon. A shapefile cannot be used.
- Write access to a drive with sufficient space for the Tile Package (typically around several GB depending on the size of your AOI).
- The image service must have a cache (see part B for how to check).
- GTAC ArcGIS Server Image Service added to ArcMap – click here to download a Quick Connect Guide on how to add the GTAC Image Services to ArcCatalog.

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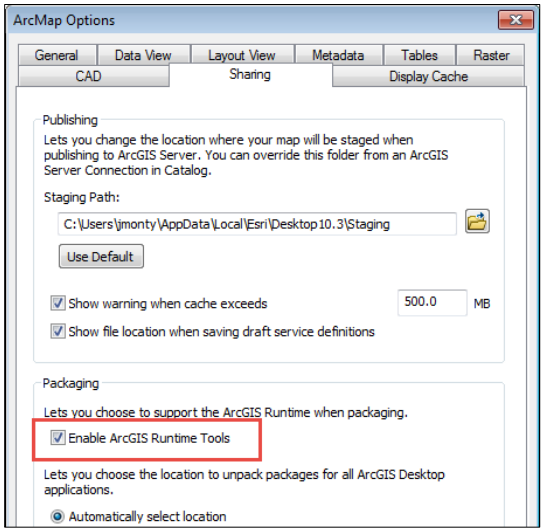
A. Enable Runtime Tools in Arc

You will need to complete the first three steps the first time you go through this process. Like other ArcGIS Settings, it will be saved automatically.

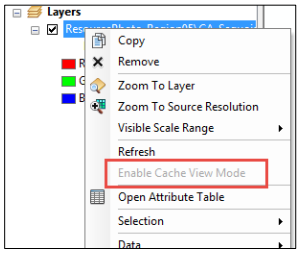
1. In ArcMap, click on **Customize – ArcMap Options….**
2. Select the **Sharing** tab.
3. Under the **Packaging** section, make sure the box is checked next to **Enable ArcGIS Runtime Tools** as shown below.



B. Verify the service has cache tiles

A base requirement for creating a tile package using the method contained in this guide is that the original service has a cache. This section will describe how to ensure the service includes cache tiles.

1. Add the service you want to use into a Map Window in ArcGIS.
2. Right-click on the service.
3. In the contextual menu, if the option to Enable Cache View Mode is grayed out (see the figure below), the service does not have a cache and cannot be used.

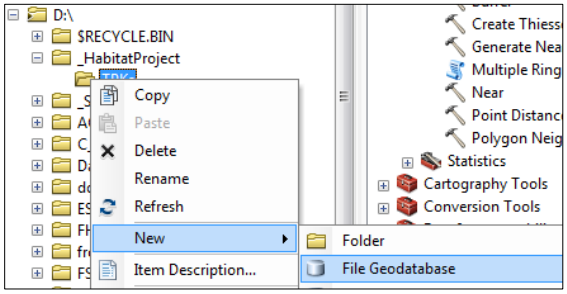


4. If you can toggle the Enable Cache View Mode on and off, then the service has a cache and can be used.

C. Create a mosaic dataset

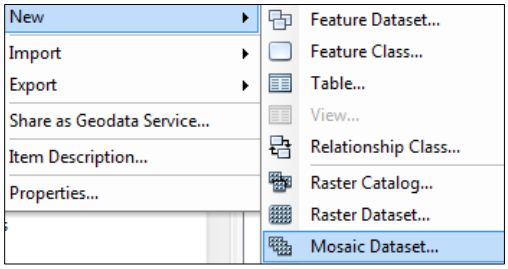
1. Open **Catalog** from within ArcMap, or open **ArcCatalog**.
2. In the Catalog pane, navigate to (or create) your project folder.

3. Right click on the folder, and select **New – File Geodatabase** (see following figure).



Be sure to use a File Geodatabase *and not a Personal Geodatabase.*

4. Give the geodatabase a relevant name.
5. In the Catalog pane, *right-click* on the geodatabase, and choose **New – Mosaic Dataset…** (see figure below.)



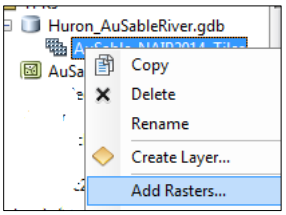
6. Type in a name for the **Mosaic Dataset Name** (such as the imagery you will be using). This name will also be used by the tools for the name of your tile package.
7. For the Coordinate System, it is recommended that you use **WGS 1984 Web Mercator (auxiliary sphere)**, but any coordinate system can be used.

The Web Mercator (auxiliary sphere) system is recommended for a couple of reasons. Satellite navigation and GPS systems use WGS 1984, and practically all image services and map services are published in this coordinate system. Keeping with Web Mercator will improve the speed at which your tile package is created, as well as its performance on your mobile device.

8. Click on **OK** in the Create Mosaic Dataset dialog.

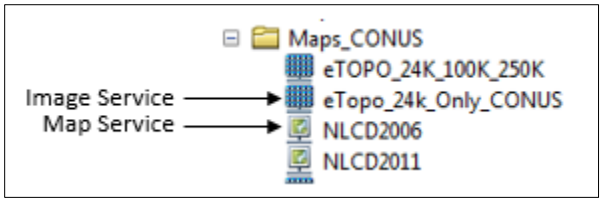
D. Add a service to the mosaic dataset

1. In Catalog, *right-click* on your new mosaic dataset, and select **Add Rasters…** as shown below.



2. For the **Raster Type**, check which service type you wish to add (see the note below.)

*Most maps on the GTAC Image Services are published as image services, which allows them to have better performance through the use of caches. However, some services, in particular the Forest Visitor Maps, are published as **map services** to take advantage of functionality not available in the image services. The icons next to the service name indicates which type the service has been published, as shown below:*



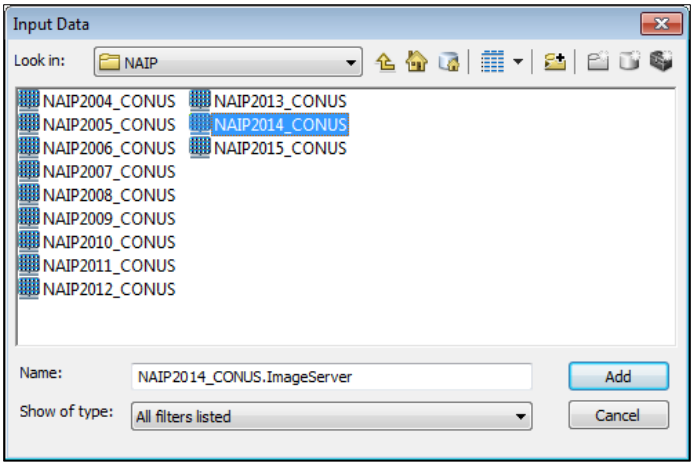
i. If you are adding imagery, click on the drop down and select **Image Service**.

ii. If you are adding a map (such as a Forest Visitor Map), click on the drop down and select **Map Service**. Note that some maps (such as the FS TOPO) are published as Image Services!

3. In the **Input Data** section under **Service**, click on the folder icon.
4. In the **Input Data** dialog, click on the dropdown next to **Look in:**, and choose **GIS Servers**.
5. Find and *double-click* on the **arcgis on 166.2.126.54** entry.

If you do not see the 166.2.126.54 server as an option, follow the link on the first page to download a Quick Guide to add the GTAC ArcGIS Server Image Services.

6. Open the folder containing the imagery or map you are interested in. We will use the 2014 NAIP CONUS service for our example in this guide, which can be found in the **NAIP** folder. Feel free to select a service of your own.
7. Click on the image service you would like to use as shown below, and then click on **Add**.



8. *Uncheck* the box next to **Update Boundary**. (For version 10.5, you may need to expand the **Mosaic Post-processing** section to find this.)
9. Click on **OK**.

10. If you are using Catalog within ArcMap, your mosaic dataset with the image service should automatic be added to the Table of Contents. If you were using ArcCatalog, open ArcMap, and then add your mosaic dataset to the map window as you would any other data.

All states collected in 2014 will appear (or the full extent of the service you chose). For the service you selected, you may need to use the Zoom to Layer tool for that service, or other navigational tools, to view the data. We will reduce the area our mosaic data set covers to a more manageable size later.

E. Review your AOI

As stated previously, this step assumes that you have a suitable feature class polygon to use. If you do not, you should create one in the File Geodatabase you created and digitize one.

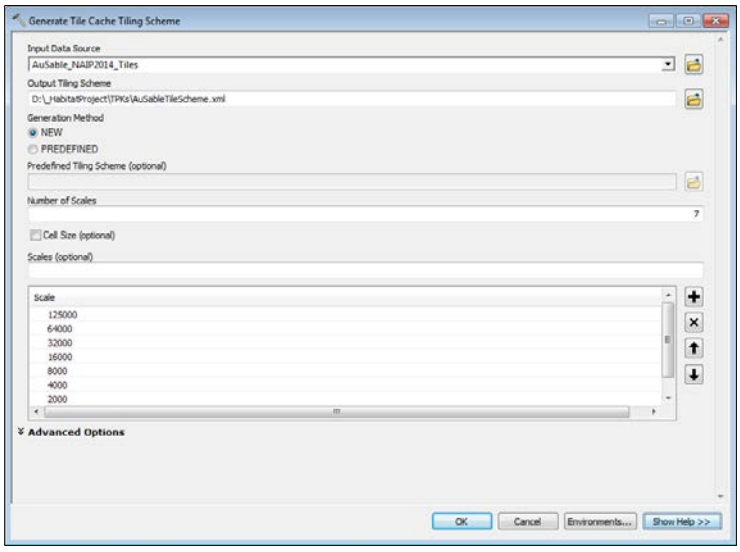
1. Add your polygon AOI to the map window, and zoom to that layer.
2. Check that the imagery contained in the AOI will be suitable for your purposes.

F. Generate a Cache Tile Scheme (optional)

The default tile cache scheme used by ArcGIS should be sufficient for most users. However, you can setup your own tile scheme to use before creating your tile package. If you are using the Web Mercator (auxiliary sphere) system as recommended for most offline work, you can skip to Part G. If you chose a different coordinate system for your mosaic dataset in Part C and want to use that for your tile package, you will need to complete this section.

The first few uses of this tool might require trial-and-error to discover the settings that work best for you.

1. In **ArcToolbox**, navigate to **Data Management – Tile Cache – Generate Tile Cache Tiling Scheme**.
2. For the **Input Data Source**, click on the folder icon and select the mosaic dataset you created in Part B.
3. For the **Output Tiling Scheme**, click on the folder icon, choose your project folder or other convenient location, type a suitable file name (we used AuSableTileScheme.xml), and click on **Save**.
4. In the Number of Scales section, enter **7** (see the figure and notes below).



For these instructions, we use the default settings. As you use this tool more, you will want to investigate the different options and scale settings.

The more large scale levels you choose, the larger your tile package will be, and longer it will take to create the package. As an example, creating a tile package for a ~350 square kilometer area of 30 cm imagery took about 40 minutes (with a high bandwidth connection) and resulted in a 1.3 GB TPK file. The time required will vary greatly with connection speed.

5. Click on **OK** to run the tool.

G. Finish setting up the Mosaic Dataset

In order to create a tile package for only your area of interest and not the entire service, we need to modify parts of your mosaic dataset. For a typical dataset, the footprint layer describes the area covered by each raster it contains, while the boundary is a polygon that encircles the entire area. For our purposes, these will cover identical areas.

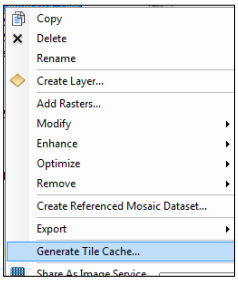
1. In Catalog, *right-click* on your mosaic dataset, and select **Modify – Import Footprint or Boundary**.
2. The **Mosaic Dataset** section should automatically be populated.
3. For the **Target Feature Class**, select **Footprint**.
4. For the **Input Feature Class**, select your feature class.
5. For both the **Target Join Field** and the **Input Join Field**, select **OBJECTID**.
6. Run the tool.
7. Complete these steps again, except use the **Boundary** for the **Target Feature Class** in step 3.

*We have found that the Boundary may not always import using these steps. If this occurs right click the Mosaic Dataset then click **Modify** then **Build Boundary**. In the Build Boundary dialog accept the defaults then click **OK**.*

8. Your Mosaic Dataset should now show only the area within your polygon. You may need to remove your Mosaic Dataset from the map, and then re-add it for it to appear correctly.

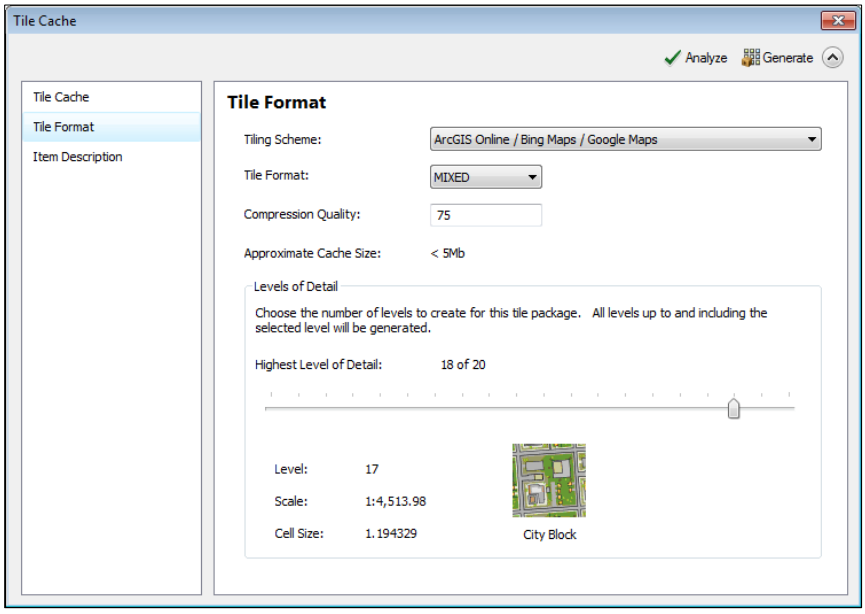
H. Create your Tile Package

1. In Catalog, *right-click* on your mosaic dataset, and choose **Generate Tile Cache…** (see below.)



2. For the **Tile Cache Name**, click on the folder icon, and choose a folder where the tile package will be saved.
3. Ensure the box is checked next to **Create tile package**, then click on the folder icon, choose your project folder, and click **OK**.

4. Click on the **Tile Format** 'tab' on the left side of the window.
5. If you did not create your own Tile Scheme in Part E, leave the Tiling Scheme as **ArcGIS Online/Bing/Google Maps**.
6. If you did create your own scheme,
   i. Click on the dropdown and choose **A tiling scheme file**.
   ii. In the file window that appears, navigate to and select the XML file that was created.
   iii. Click on **OK**.
7. If you chose the default tiling scheme, in the **Levels of Detail** section click and drag the slider to set the highest level of detail you desire, paying attention to how the **Approximate Cache Size, Cell Size** and **Scale** values vary. Note that in the example below we have moved the slider to Level 17, since this is equivalent to 1.19 meter cell size, and the original imagery (2014 NAIP) was collected at 1 meter.



8. Click on the **Item Description** 'tab', and enter a **Summary** and add **Tags**. These are required in order to create a tile package.
9. Click on the **Analyze** button at the top of the window, and correct any errors that appear.
10. Once everything is set, click on the **Generate** button.

The time required to build the tile package depends on your area of interest, number and level of detail of your tiles, and connection speed, and could take several minutes to several days.

11. When the package has finished building, copy it to your mobile device and check that it works in Collector or other mobile device app. You can also add it to ArcMap for review.