

NASA ARSET Training  
Cartagena, May 19-22, 2015  
**Activity S2\_A2: Adding Spatial Data to ArcMap**

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**Objective:** Using the data acquired from the previous activity (S2\_A1: Multi-year Rainfall Analysis), import into ArcMap.

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**There are two parts to this exercise:**

- 1) Adding a netCDF file to ArcMap
- 2) Adding a WMS (Web Map Service) Server to ArcMap
  
- 3) Optional additional exercises:
  - a. Import individual SEDAC shapefile and geotiff data into ArcMap
  - b. Add Additional layers available through ArcGIS Online

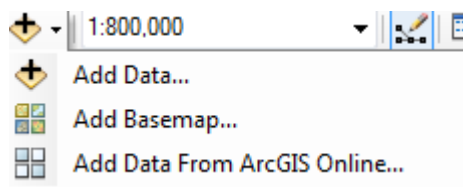
**Part 1: Adding a netCDF file to ArcMap**

Open ArcMap by double clicking on the Globe with a magnifying glass icon or by going to Start > **All Programs in Window Explorer > Click the ArcGIS folder > and select ArcMap.**

**When the ArcMap Getting Started window opens up, open an existing map or if this is a new map exercise, click cancel to open a blank map. This is an untitled map document (.mxd).** *Map documents do not actually store the map data. It does store what data to show and how to show it and where to find that data.*

**Adding a basemap**

- a. Before we begin importing data into ArcMap, you will want to first add a basemap. A basemap is used for locational reference and provides a framework on which users overlay operational layers to visualize geographic information. The basemap serves as a foundation for all subsequent operations and mapping.



- b. Open ArcMap and using the Add Data Icon
- c. Click Add Basemap...
- d. Choose the Basemap of your choice (Imagery or Imagery with Labels work well).

### **Import a NetCDF file into ArcMap (network Common Data Form)**

NetCDF (network Common Data Form) is an interface for array-oriented data access and a library that provides an implementation of the interface. The netCDF library also defines a machine-independent format for representing scientific data. Together, the interface, library, and format support the creation, access, and sharing of scientific data. <<http://www.unidata.ucar.edu/software/netcdf/>>

- a. In order to add netCDF data to ArcMap, navigate to the Geoprocessing Tab and open the ArcToolbox.
- b. Locate the Multidimension Tools and open. Open the **Make netCDF Raster Layer** tool and the toolbox window will open.
- c. Within the **Make netCDF Raster Layer** tool:
- d. For the field, **Input netCDF File:** Navigate to and click on the previously downloaded netCDF file. The remaining fields will fill in accordingly, KEEP the default values.
- e. The variable value of the netCDF file is used to assign cell values to the output raster. This is the variable that will be displayed, such as temperature or precipitation.
- f. For the X Dimension field, the default should be longitude (lon); for the Y Dimension field, the default should be longitude (lat).
- g. For the Output Raster Layer, you may change the output file name if you choose. In this case you could enter the month and year
- h. Click OK to run the tool.

### **Symbology**

Once imported, you can adjust the symbology of the raster file through through the layer properties, symbology tab.

- i. Right click the layer, navigate to layer properties and the Symbology tab.

Within the Show window, the geotiff or raster file will be typically be displayed as a “Stretched” type. If you wish you are able to adjust the color gradients by navigating to the dropdown arrow next to the Color ramp.

Options to alter the way the data is displayed in ArcMap include:

- a. selecting the box to **Invert** the color ramp
- b. selecting the box to **Display Background Value** of ‘0’ as No Color.
- c. choosing ‘**Classified**’ as the show type. Here you can choose the number of classes applied to the range of values, how the classes are grouped and adjust the color scheme applied to each.
- d. choosing ‘**Unique Values**’ as the Show type. Once again, you can adjust the Color Scheme and/or alter the colors assigned to each pixel value category by double clicking each color value and choosing a color that will make the file easier to see on the map.

You will notice within the Layer Properties of a netCDF file, there will be an additional tab 'NetCDF'. Within this tab, you can toggle through the available variables that will be displayed in the map.

## **Part 2: Adding the SEDAC WMS (Web Map Service) Server to ArcMap**

For this part of the exercise, there will be reference to the SEDAC data portal. If you are new to SEDAC and wish to download data from the site, you will need to register here:

<http://sedac.ciesin.columbia.edu/user-registration>

### **Adding the SEDAC WMS (Web Map Service)**

- a. Go to "File -> Add Data -> Add Data"
- b. Select "Add WMS Server" and click on "Add" button.
- c. Enter <http://sedac.ciesin.columbia.edu/geoserver/ows> in the "URL" field.
- d. Leave the Version field as "Default version" Click 'Get Layers' and click on the "OK" button.
- e. In the next dialog box, make sure the server "GeoServer Web Map Service on sedac.ciesin.columbia.edu" is selected and then click on the "Add" button.
- f. In the next dialog box, select "GeoServer Web Map Service" and click on the "Add" button. The service should show up in the "Layers" panel in the left.
- g. Select the "GeoServer Web Map Service" on the Layers panel and expand it by clicking on the "+" sign.
- h. There will be another "GeoServer Web Map Service" there. Select and expand it.
- i. All the layers will be listed now with some already enabled. From here you have the option to turn on and off the layers you wish.
- j. The legend for each layer can be found in the layer property styles tab. You may add the legend to the map by right clicking the layer and selecting 'Add WMS Legend to Map'.

*Note:* Since this is a WMS that contains all available SEDAC data layers (and there are many to choose from) it is possible not all layers will be available for your region. You may need to reference the SEDAC website for details on the data of which you are interested. <http://sedac.ciesin.columbia.edu/>

The WMS layer display and symbology may not have as many options as with individual imported raster or shapefile files. To have more symbology options you may wish to download the individual raster or shapefiles and add them as referenced in Parts 1 and 2 above.

If your layer of interest displays in a way that covers other data layers, you can navigate to the first data layer 'GeoServer Web Map Service', right click and open the Properties window. Under the Advanced tab you can adjust all the layers' display transparency and/or background color.

*optional*

## **Part 3a) Import individual SEDAC shapefile and geotiff data into ArcMap**

For this part of the exercise, there will be reference to the SEDAC data portal. If you are new to SEDAC and wish to download data from the site, you will need to register here:

<http://sedac.ciesin.columbia.edu/user-registration>


### **Import Shapefile**

- a. Zoom to your region of interest.
- b. As an example, we will import the shapefile for the roads of South America into ArcMap.
- c. Download the shapefile here:

<http://sedac.ciesin.columbia.edu/downloads/data/groads/groads-global-roads-open-access-v1/groads-v1-america-shp.zip>

You will have to unzip the folder before you can use it. Extract the files contained within the folder and place them where you can easily find them in the next step.


- a. Using the Add Data Icon, click Add Data and a window will open for you to navigate to the location of the downloaded shapefile.
- b. Click the shapefile and click Add. - it will have the extension **.shp** and a symbol next to it that

looks like this:  The shapefiles has been imported. You may wish to adjust the symbology color in order to visualize the roads better.

- c. Right click the newly added shapefile layer, navigate to layer properties and the Symbology tab, click the symbol color and choose your desired color from the list of choices. Click ok.

### **Import Geotiff raster**

- a. As an example, go the the SEDAC webpage for global agricultural lands:  
<http://sedac.ciesin.columbia.edu/data/set/aglands-croplands-2000/data-download>
- b. Download the geotiff for South America. Unzip the file.
- c. Use Maps tab from the SEDAC site to inspect the legend associated with this raster data file.
- d. Using the Add Data Icon, click Add Data and a window will open for you to navigate to the location of the downloaded geotiff file. Click on the Raster Dataset and click Add. - for a geotiff,

it will have the extension **.tif** and a symbol next to it that looks like this: 

### **Symbology**

You can adjust the symbology of the geotiff file through through the layer properties, symbology tab.

- a. Right click the layer, navigate to layer properties and the Symbology tab.

- b. Within the Show window, the geotiff or raster file will be typically be displayed as a “Stretched” type. If you wish you are able to adjust the color gradients by navigating to the dropdown arrow next to the Color ramp.

Options to alter the way the data is displayed in ArcMap include

- a. selecting the box to **Invert** the color ramp
- b. selecting the box to **Display Background Value** of ‘0’ as No Color.
- c. choosing ‘**Unique Values**’ as the Show type. Here you can adjust the Color Scheme and/or alter the colors assigned to each pixel value category by double clicking each color value and choosing a color that will make the file easier to see on the map.

### **Part 3b) Additional Layers available through ArcGIS Online**

ArcGIS also has the option to add layers to your map through the ArcGIS online portal. Once again, navigate to the Add Data icon and click ‘Add Data from ArcGIS Online’

- a. In the search field, keywords such as ‘South America’ or ‘srtm’ can be used to locate useful datasets.
- b. Each layer package has details on the dataset and an ‘Add Data’ option.
- c. Navigate to and add the ‘**HydroSHEDS (RIV) - South America river**’ shapefile to your map.

*Note; Some layers will require you to sign in or register with ArcGIS Online*

Discover the data layers that may be useful to you and add them to you map. What knowledge can be gained from the combination of these datasets?

### **Additional Notes on Using ArcMap**

As good housekeeping, if you choose, it is a good idea to create a new geodatabase for each new map (project). To do so open the ArcCatalog icon and create a new file geodatabase connection with a name appropriate to your project. This is where all new layers and file created during the project will be stored.

To connect your new map and assign this as the project’s database: under the main file menu tab and open the map document properties. Navigate to the default geodatabase and set it to a path specific to the new file you specified in the step above. Additionally, be sure that the box for “Store relative pathnames to data sources” is checked.