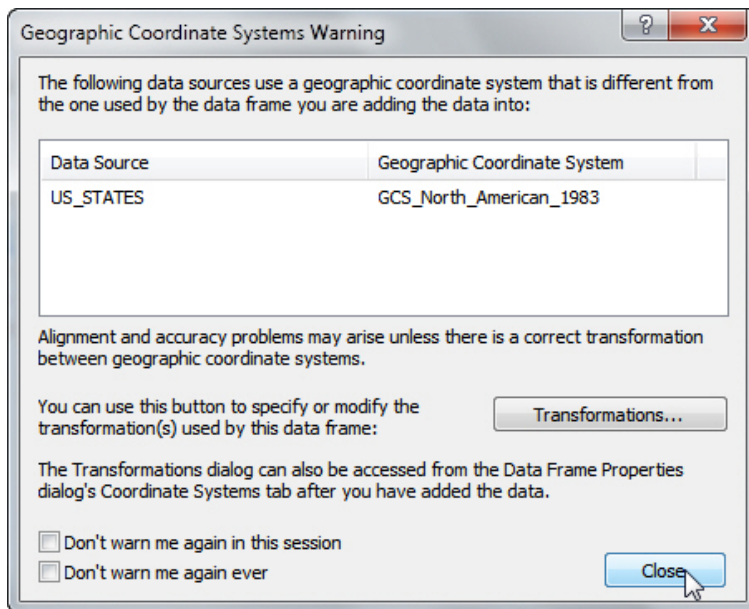


## SECTION 3: ADVANCED DATA MANAGEMENT

### 3.1 Defining Map Projections

ArcMap generally does an adequate job of “projecting on the fly,” or making the necessary translations between different projections. This allows data from different projections to be mapped in the same project. When a projection is being done “on the fly,” you will receive a message like the one below, but in most cases the accuracy will be sufficient for your purposes.



#### What is a map projection?

A map projection is used to portray all or part of the round Earth on a flat surface. This cannot be done without some distortion.

Every projection has its own set of advantages and disadvantages. There is no “best” projection.

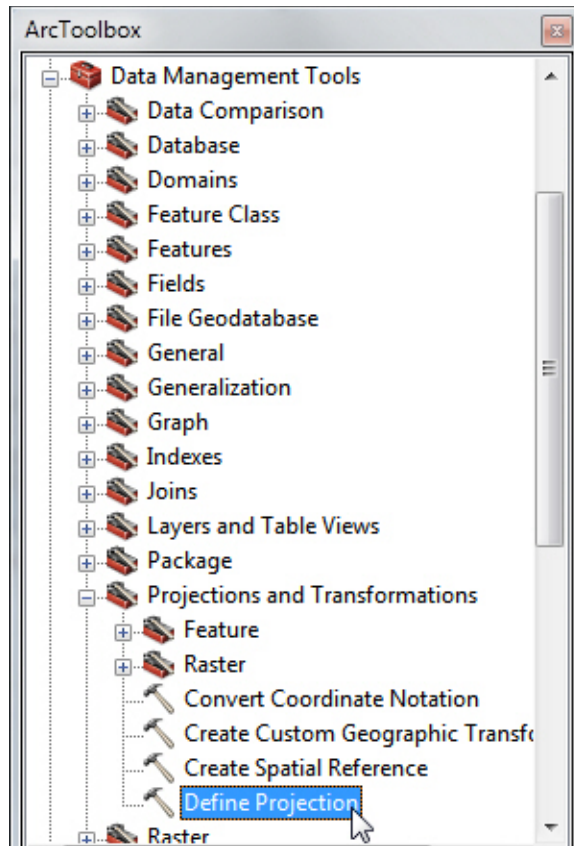
The mapmaker must select the one best suited to the needs, reducing distortion of the most important features.

*From the USGS web page “Map Projections.” (<http://egsc.usgs.gov/isb/pubs/MapProjections/projections.html>)*

Occasionally, this doesn’t work, however, and a projection must be defined for one or more map layers.

To do this, start **ArcToolbox** by clicking on the small toolbox icon (  ) in ArcMap.


Within ArcToolbox, double-click “Data Management Tools” to expand that menu, then double-click “Projections and Transformations,” and finally, double-click “Define Projection”:

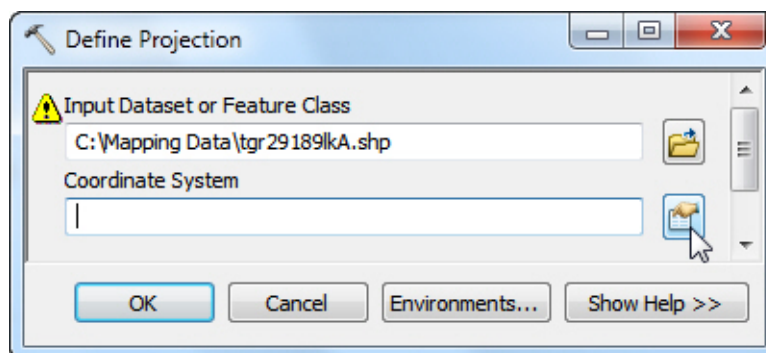


This opens a wizard that will guide you through the process.

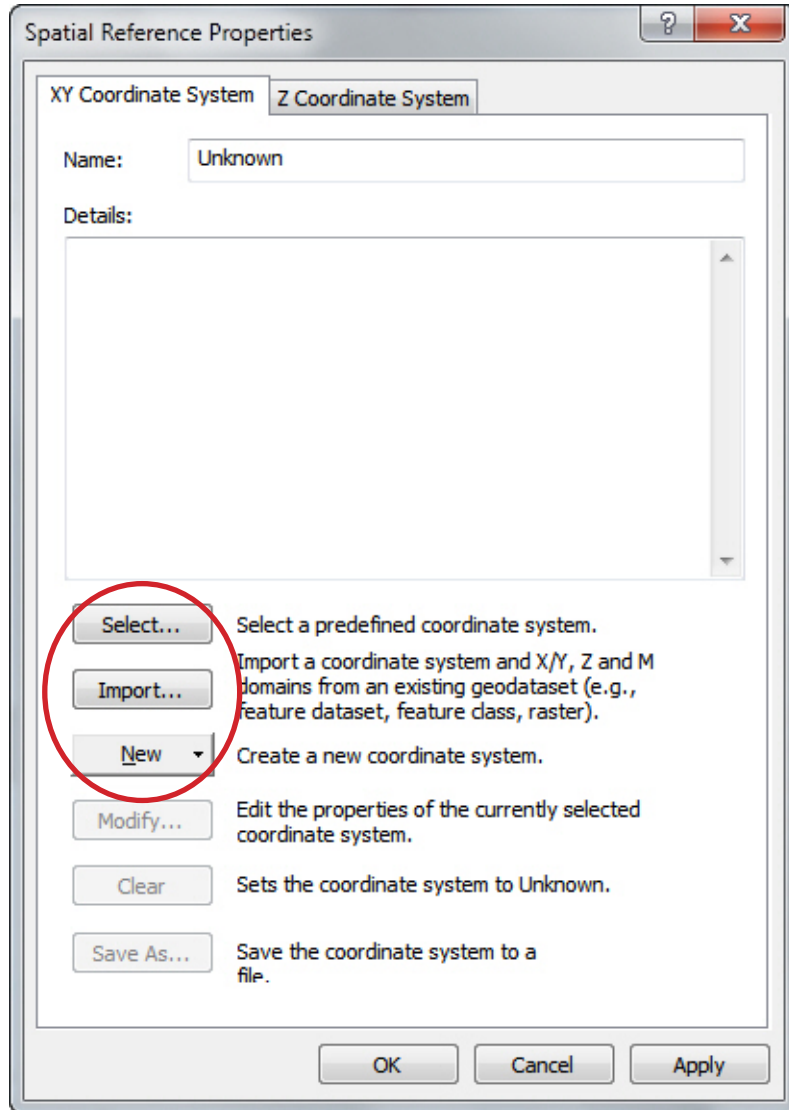
In the first box, navigate to the map layer (known formally as the dataset or feature class).

In the second box you will specify the coordinate system. *(The coordinate system should be known or available from the source of the data. If not, you will need to contact the data provider.)* Sometimes the coordinate system will automatically fill in when you specify the map layer. If it fills in for you, the projection is already assigned. Click “Cancel” to close the dialog box.

If the coordinate system does not automatically fill in, you will have to specify it. Click on the icon  to the right of the box.



The “Spatial Reference Properties” dialog box will pop up, and you can select one of three common options:



1)

If you opt to **select** the coordinate system, you will need to navigate to an appropriate geographic or projected coordinate system. At the risk of over-simplification, the geographic coordinate systems use a latitude / longitude system that assign every point on Earth a unique coordinate. In other instances, usually for maps covering a smaller area, projected systems are used. In either case, selecting the appropriate coordinate system is a matter of navigating through the folders to find the appropriate choice.

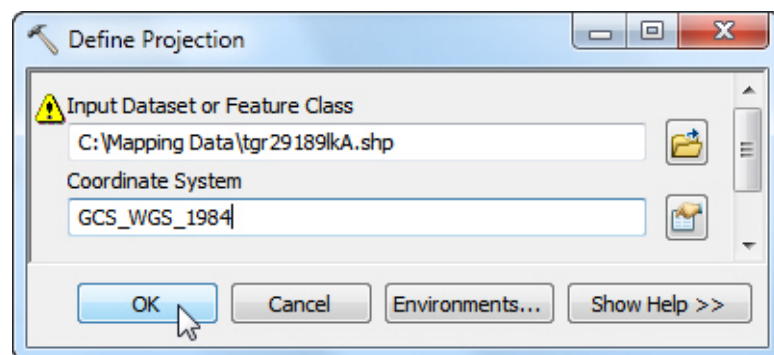
2)

If you choose to **import** a projection already used by another shapefile, you will be prompted to locate the layer with the projection you want to use. When the data file has been located, simply double-click on it or click it and then click “Add.” This will assign the projection of the shapefile you just chose to the unprojected one.

3)

If you need to define a **new** coordinate system not available in the selections covered in the first two options, you will need the relevant data from the data provider to complete the dialog box. (Note that this is very rarely needed; in almost all cases one of the other two options above is the right choice.)

Whichever of the three options you use, click “OK” when you have completed the “Spatial Reference Properties” dialog box. Then click “OK” to close the “Define Projection” dialog box, and a projection will have been defined for the layer.



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