

What You Will Need

- ArcIMS 9
- ArcGIS 9 (ArcView, ArcEditor, or ArcInfo license)
- Sample data downloaded from *ArcUser Online*
- An unzipping utility such as WinZip

Georeferencing ArcIMS Services

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GIS users analyze relationships among real-world objects. Features in a GIS must be georeferenced so data can be correctly related to locations on the earth's surface. Georeferencing data is accomplished by assigning a coordinate system—a reference system used to locate geographic features on a two- or three-dimensional surface.

Despite the importance of georeferencing datasets, many ArcIMS Image and Feature Services defined from map configuration files (.axl files created in ArcIMS Author), do not have a properly assigned coordinate system. All datasets in a GIS, including ArcIMS services, must be spatially referenced with a coordinate system to ensure data accuracy.

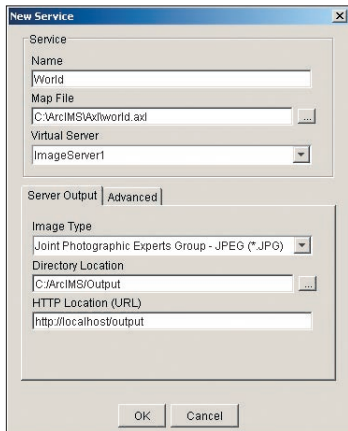
Georeferencing data for ArcIMS services is critical. If an ArcGIS Desktop user adds data from an undefined ArcIMS service to a project containing local data with a defined coordinate system, the two datasets will probably not integrate correctly.

An accompanying article, “Understanding ArcIMS Projection Elements,” reviews the ArcXML projection elements that should be used in a map configuration file to define georeferencing systems. The following short exercise illustrates the effects of not defining the projection of an ArcIMS service and shows how projection elements can easily be added to a map configuration file. Both ArcIMS and ArcGIS are required for this exercise. A basic understanding of ArcIMS is assumed.

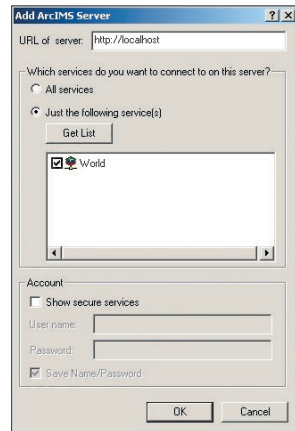
Getting Started

Visit the *ArcUser Online* Web site at www.esri.com/arcuser and download the archived dataset for this exercise. Use WinZip to unzip the file. It contains only one file, *cntry_Robinson.shp*. This shapefile uses the World_Robinson projected coordinate system.

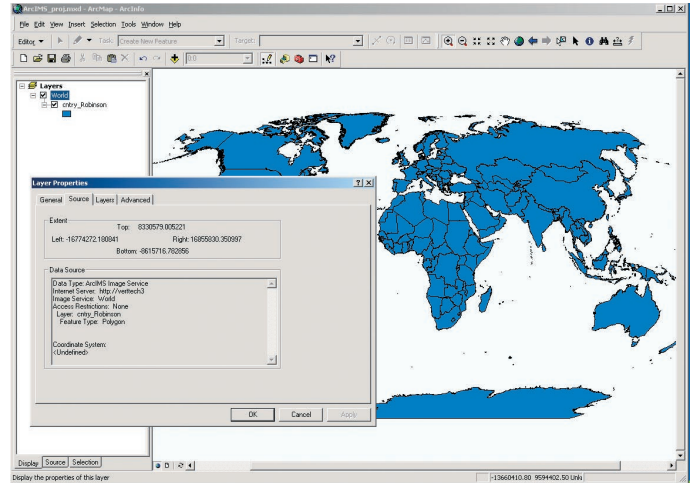
1. Start ArcIMS Administrator and use the ArcIMS Author application to create a new map configuration file. Add *cntry_Robinson.shp*.
2. In the Standard menu, choose View > Scale Bar Properties > Map Units and change the map units to meters.
3. Save the map configuration file with the name *world.axl*.



Using ArcIMS Administrator, create an Image Service with the name *World* that points to the map configuration file *world.axl*.



In ArcMap, add the ArcIMS Image Service as a data source.

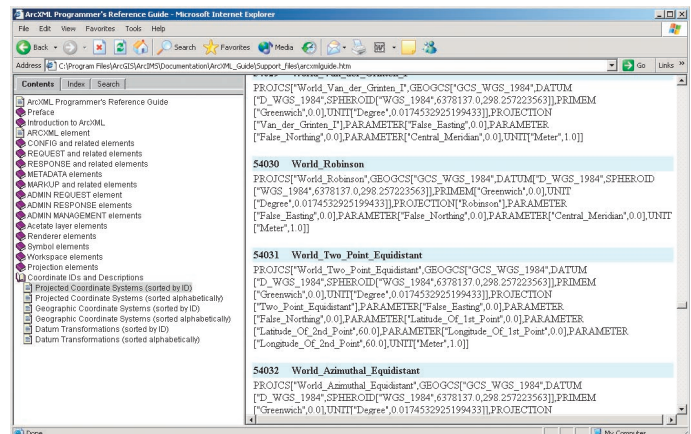


Although the *cntry_Robinson* layer will display, checking the Layer Properties dialog box reveals that the coordinate system is undefined.

Create and View an ArcIMS Service

Using ArcIMS Administrator, create an Image Service with the name *World* that points to the map configuration file *world.axl*. The *World* Image Service will be used in ArcMap to visualize the effects of projection elements in the map configuration file.

1. Start the ArcMap application in ArcGIS and open a new blank document. Click the Add Data button. In the Add Data dialog box, select GIS Servers from the drop-down list.
2. Click Add ArcIMS Server and type in your ArcIMS server name for the URL of the server.
3. Click the Select Just the Following Service(s) radio button and click the Get List button. Check the check box for *World* service and click OK to close the dialog box.
4. In the Add Data dialog box, click on the connection you just made, then select *World* service. Click OK. ArcMap will display the following warn-



Use the ArcXML Programmer's Reference Guide, available locally or online, to determine the projection ID for *World_Robinson*.

```
<?xml version="1.0" encoding="UTF-8"?>
<ARXML version="1.1">
  <CONFIG>
    <ENVIRONMENT>
      <LOCALE country="US" language="en" variant="" />
      <UIFONT color="0,0,0" name="SansSerif" size="12" style="regular" />
      <SCREEN dpi="96" />
    </ENVIRONMENT>
    <MAP>
      <PROPERTIES>
        <ENVELOPE minx="-16774272.180841383" miny="-8615716.78285593" maxx="16855830.35099669"
          maxy="8330579.005221328" name="Initial_Extent" />
        <MAPUNITS units="meters" />
        <FEATURECOORDSYS id="54030" />
        <FILTERCOORDSYS id="54030" />
      </PROPERTIES>
      <WORKSPACES>
        <SHAPEWORKSPACE name="shp_ws-0" directory="C:\testing123\data\data" />
      </WORKSPACES>
      <LAYER type="featureclass" name="cntry_Robinson" visible="false" id="0">
        <DATASET name="cntry_Robinson" type="polygon" workspace="shp_ws-0" />
        <SIMPLERENDERER>
          <SIMPLEPOLYGONSYMBOL boundarytransparency="1.0" filltransparency="1.0"
            fillcolor="27,127,227" boundarycaptype="round" />
        </SIMPLERENDERER>
      </LAYER>
    </MAP>
  </CONFIG>
</ARXML>
```

In the map configuration file, use a text or XML editor to manually add the FEATURECOORDSYS and FILTERCOORDSYS elements and specify the projection ID for World_Robinson.

ing message: "One or more layers is missing spatial reference information. Data from those layers cannot be projected." Click OK.

5. Expand the World layer and make cntry_Robinson visible. The image from the World service sent by the ArcIMS server will be displayed, but the coordinate system for this service is undefined. This can be verified by right-clicking on the World service and choosing Properties > Source tab. Without the projection information, ArcMap cannot reproject this service on the fly to match any existing layers. Exit ArcMap without saving the map document.

Add Projection Elements to the Map Configuration File

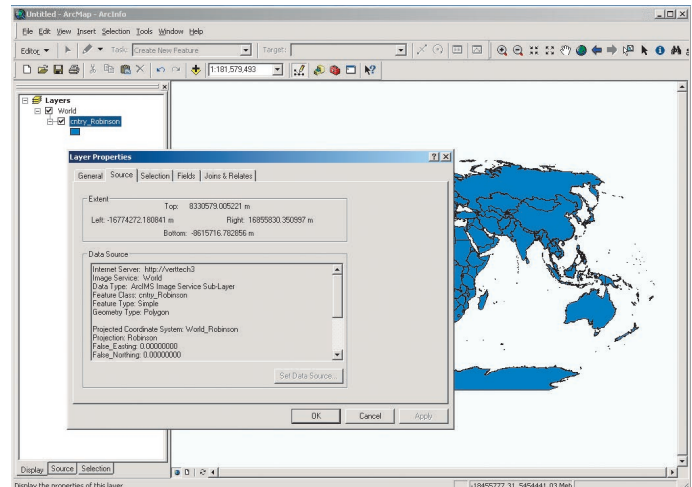
The *ArcXML Programmer's Reference Guide* contains the information needed to add projection elements to a map configuration file. It is included in a typical installation of ArcIMS but can also be accessed online at the ESRI Support Web site. To access the guide locally, open ArcIMS Help and choose *ArcXML Programmer's Reference Guide* from the welcome screen. To access the guide online, go to support.esri.com, click on the For Developers tab, and choose ArcXML.

With the *ArcXML Programmer's Reference Guide* open, choose Coordinate Ids and Descriptions > Projected Coordinate Systems and locate the listing for World_Robinson. Its projection ID is 54030. The projection of the World service can be defined by adding projection elements to the map configuration file. The three projection elements are

- FEATURECOORDSYS—Output service projection
- FILTERCOORDSYS—Input service projection (envelope coordinates)
- COORDSYS—Input layer projections

The cntry_Robinson shapefile has a .prj file associated with it. This can be verified by looking at the files that make up cntry_Robinson in Windows Explorer or viewing the metadata for this shapefile in ArcCatalog. In this case, it is not necessary to add COORDSYS to the map configuration file. However, FEATURECOORDSYS and FILTERCOORDSYS elements will be added. Note that the COORDSYS element does not project the layer; it provides the metadata used by the FEATURECOORDSYS and FILTERCOORDSYS elements. Projection elements can only be added to the map configuration file manually.

1. Open the world.xml file in a text or XML editor.
2. Between the opening and closing PROPERTIES elements, add the FEATURECOORDSYS and FILTERCOORDSYS elements and use the id="54030" to specify the World_Robinson projection for both elements.
3. Save the changes to the map configuration file and close it. In ArcIMS Administrator, choose Service > Refresh Service.



After refreshing the Image Service, open a new ArcMap document and add the World service. No error message will display and additional data can be integrated correctly.

Redisplay the Service in ArcMap

Start ArcMap and open another blank document. Add the World service to the ArcMap session as previously described. The connection to the ArcIMS World service should still be listed under ArcGIS Servers. The World service should display in ArcMap without displaying the error message and with its coordinate system defined. Verify that ArcMap recognizes the World service's projection is Robinson by opening the Layer Properties for the World service and clicking on the Source tab. Now, other data from different projections can be added and integrated with the World service without any problem.

Adding the projection elements to a map configuration file defines the projection of an ArcIMS service and is an important step that makes it easy for clients, such as ArcMap, to detect the defined projection and integrate it correctly with other data.

Resources

For additional information on projections and ArcIMS, including more documentation on defining datum transformations and sending projection requests, consult the "Using Projection Elements" help page in the *ArcXML Programmer's Reference Guide*, available online at support.esri.com. A two-day, instructor-led course, *Customizing ArcIMS Using ArcXML*, is also offered by ESRI Educational Services.

Understanding ArcIMS Projection Elements

Coordinate systems in ArcIMS are handled by the ArcIMS Spatial Server through three ArcXML projection elements: COORDSYS, FEATURECOORDSYS, and FILTERCOORDSYS. These ArcXML elements are used to identify the input projections of data layers, the output projection of a map service, and the coordinate system for envelopes or spatial filters in the map configuration file.

Each projection element includes a reference to a coordinate system through either an identification number (id attribute) or a string definition (string attribute). Using the id attribute is a quick way to reference a predefined coordinate system with a single reference number. The string attribute describes all parameters for a coordinate system including the datum, units, and meridians. Other optional attributes allow you to identify datum transformations, including the identification numbers and definition strings, are available in the *ArcXML Programmer's Reference Guide*.

All coordinate systems are categorized as either geographic or projected. In geographic coordinate systems, locations are measured in degrees of latitude and longitude and are three-dimensional. In projected coordinate systems, the earth's surface is projected onto a two-dimensional plane and locations are measured in meters or feet (also called planar or Cartesian).

Input Layer Projections

Each layer listed in a map configuration file must reference a coordinate system. Using the COORDSYS element is one method of defining the projection metadata for a data layer. This element does not reproject data to another coordinate system; it only states the layer's coordinate system. This element can be used to identify the input coordinate systems for shapefiles, coverages using ArcSDE for Coverages, ArcSDE layers, supported raster images, and acetate layers.

Under most circumstances, the COORDSYS element is not required for a map configuration file. The COORDSYS element is only required if

- A projection (*.prj) file is not defined for a shapefile.
- A *.prj file is not defined for a coverage in ArcSDE for Coverages.
- No spatial references table is used in ArcSDE.

- Datum transformation information is needed for the layer.
- Raster layers are being used.

For a layer without input projection information, the COORDSYS element can be added by editing the map configuration file with a text editor or XML editor. When non-English characters are used, make sure the XML editor used supports UTF-8. The COORDSYS element is a child of the LAYER element. If there is no *.prj file or spatial reference table or the COORDSYS element is not present, the layer will not be projected properly.

Adding Projection Elements to a Map Configuration File

In a map configuration file, the FEATURECOORDSYS element specifies the output coordinate system for an ArcIMS service. The FILTERCOORDSYS element is used to specify the coordinate system of any envelopes or spatial filters listed in the file. These elements are child elements of the PROPERTIES element.

The ArcIMS service extent attributes of the ENVELOPE element are defined when the map configuration file is created in ArcIMS Author. All map configuration files must include the ENVELOPE element. When defining the FILTERCOORDSYS element in the map configuration file, make sure the coordinate system of the element matches the ENVELOPE units.

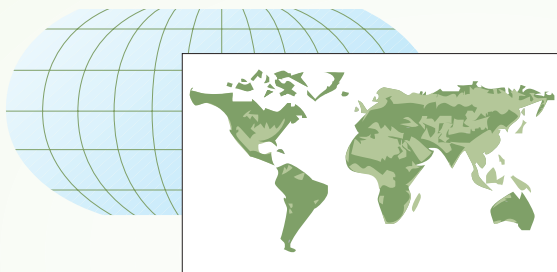
The FEATURECOORDSYS element is required if the FILTERCOORDSYS element is included in a map configuration file. In all map configuration files, the coordinate systems of both projection elements must share the same id or string attribute.

In this example, World Robinson (id = 54030) is used to identify the coordinate system for both elements. Because the FEATURECOORDSYS element defines the output service projection, any ArcIMS services created from this map configuration file will match the coordinate system of this element.

When the FEATURECOORDSYS element is added to the map configuration file, the MAPUNITS element is ignored. The ArcIMS Spatial Server determines the correct map units based on the coordinate system defined in the FEATURECOORDSYS element.

For more information on using these elements, see the section on Projection Elements in the *ArcXML Programmer's Reference Guide*, which is available online at support.esri.com.

Input layer projections (COORDSYS)



Coordinate systems in ArcIMS are handled by the ArcIMS Spatial Server through three projection elements—COORDSYS, FEATURECOORDSYS, and FILTERCOORDSYS.

Output service projection (FEATURECOORDSYS)



Envelope coordinates (FILTERCOORDSYS)

```
<ENVELOPE minx="-16774272.180841383" miny="-8615716.78285593"
maxx="16855830.35099669" maxy="8330579.005221328" />
```