About projecting raster datasets on the fly

ArcMap can perform what is commonly known as on-the-fly projection. This means ArcMap can display data stored in one projection as if it were in another projection. The new projection is used for display and query purposes only. The actual data is not altered.

When is data projected on the fly?

Data is projected on the fly anytime a data frame contains a layer whose coordinate system is defined as something different from the coordinate system definition of the data frame. A data frame's coordinate system can be defined manually or by adding data with a defined coordinate system.

ArcMap will not project data on the fly if the coordinate system for the dataset has not been defined. A dataset with an undefined coordinate system will simply be displayed in its native coordinate system. The coordinate system for any dataset can be defined using ArcCatalog.

The first layer added defines the data frame's coordinate system. This is true whether the data is projected or geographic.

For example, if the first layer added contains a Lambert Conformal Conic projected coordinate system, all other layers will project on the fly to match this.

Similarly, if the first layer added to the data frame contains data that uses a WGS84 geographic coordinate system, all other layers will adjust to match this. Even data that uses a projected coordinate system will unproject on the fly.