Introduction to Planetary Image Analysis With ArcGIS®

Quick Reference Guide

Presented by the

 Spacecraft Planetary Imaging Facility (SPIF), Cornell

Sponsored by the

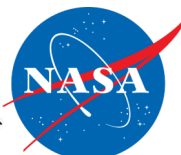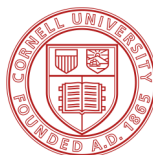 Regional Planetary Image Facility (RPIF) Network

Table of Contents

Common File Types

* **Data frame**

    * Contains one or more layers, part of the map document structure

    * Only one data frame can be active at a time, can activate by right-clicking menu of the data frame or by Alt-left-clicking on the data frame

    * Only the active data frame can be viewed in Data View; in Layout View, only the active data frame can be altered

* **Feature Class**

    * Similar to shapefile, but with additional files for use in ArcGIS

    * Can ONLY be used within an ArcGIS geodatabase, can be exported as a shapefile, can be exported as a shapefile

* **Feature Dataset**

    * Contains multiple feature classes related by content, must have the same coordinate system

* **Geodatabase**: *gdb (default geodatabase:)

    * ArcGIS file structure for storing, organizing, and sharing data with other ArcGIS users

* **Image Files**: *tif

    * Common: TIFF (regular or GeoTIFF), JPEG, JPG2, PNG, BMP, GIF, etc.

    * Dataset specific: SAR, SRTM, DEM, DOQ, LAS, many more

* **Layer**: *.lyr

    * Store information for how to display a particular data source or dataset

    * Does NOT store any source data

* **Map Document**: *.mxd

    * Stores information for how to display all data in a map

    * Does NOT store any source data

* **Packages**: *.lpk , *.mpk

    * Stores both display instructions and source data

    * Good for sharing with other ArcGIS users who do not have access to your geodatabase

* **Shapefile**: *.shp

    * Stores spatial and geometric data for features

    * Used by most GIS software , can be used in ArcGIS but not within a geodatabase, can be imported as a feature class or exported from a feature class

* **Table**

    * Tabular data, can be imported from other formats like MS Excel and then added to the attribute table of a feature class, or can be exported from the attribute table data of a feature class

Main components of the ArcMap window
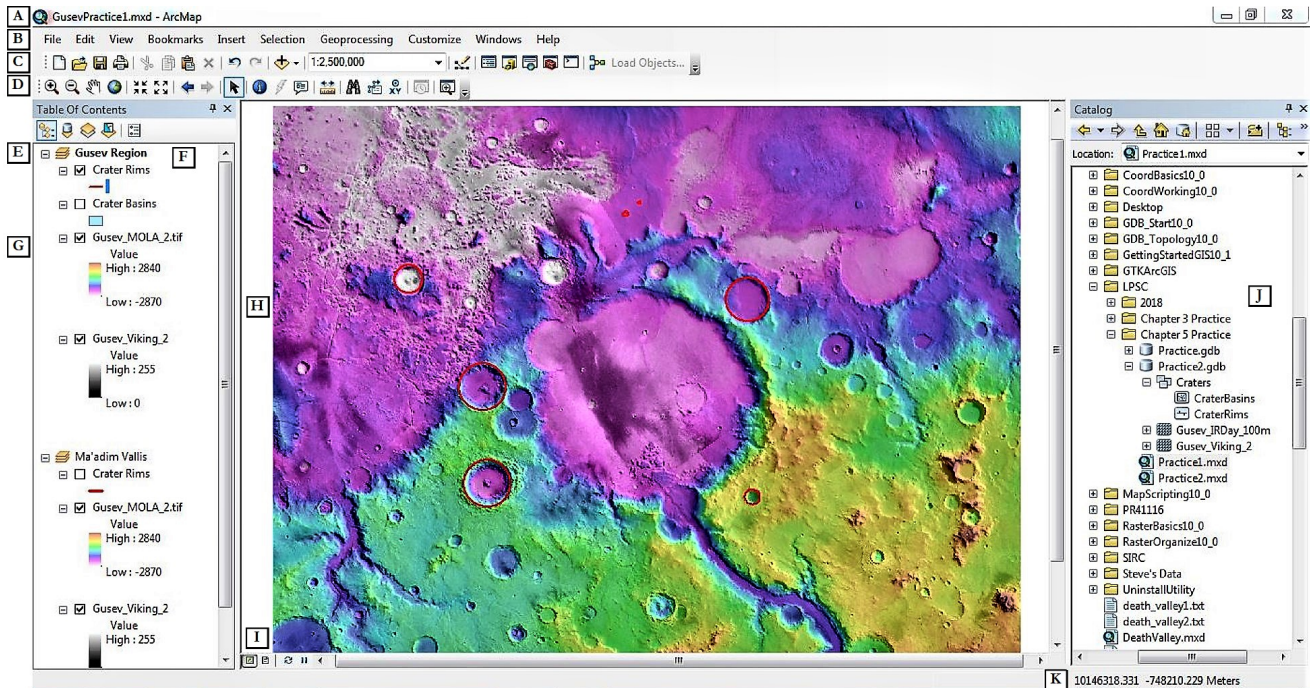
A. The **Title** bar shows the name of the application, ArcMap, and the name of the map document you are working with.

B. The top menu bar.

C. The **Standard** toolbar contains tools for managing the map document and controlling which elements of ArcMap are visible.

D. The **Tools** toolbar contains key tools and buttons you will frequently use, including most map navigation tools.

E. A data frame is a container for a map's layers and can be used to organize them. Only one data frame can be active at any time and this determines what you see in the main workspace.

F. The **Table of Contents** contains a list of all the data frames and layers in the map document.

G. A layer is an organized set of geographic features with the same type of geometry (point, line, polygon) or a raster (image).

H. The map display is the main workspace where you can view layers in a data frame and their components.

I. The map display buttons control whether you are in **Data View**, where you will work on editing the data frames and layers, and the **Layout View**, where you will organize your data frames into presentable documents with elements like titles, keys, and scale bars.

J. The **Catalog** window allows you to connect to ArcCatalog and perform some of the features of that applications including exploring and organizing data. It also allows convenient loading of data by just dragging and dropping into the map display.

K. This shows you the position of the cursor in the coordinates of the data frame. You can change the units shown here by going to the **Customize** menu, selecting **ArcMap Options**, and on the **Data View** tab click **"Use these units instead . . ."** and use the dropdown menu to set your desired units.

Toolbars

The Standard toolbar
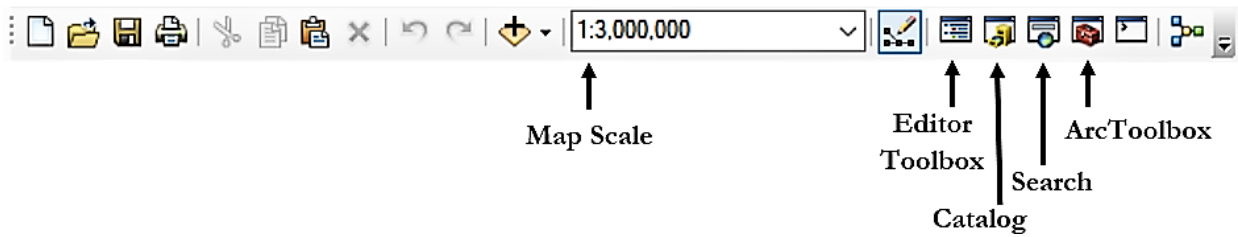
The Tools toolbar
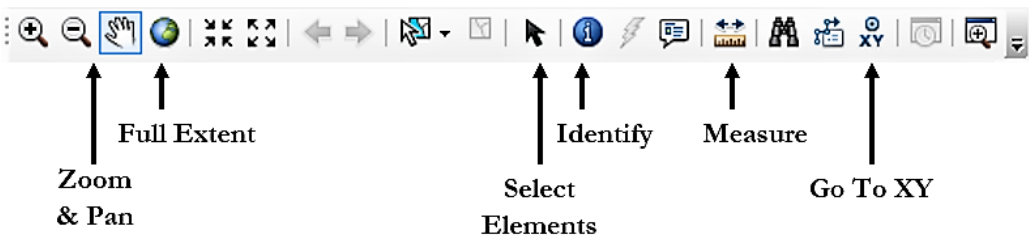
The Layout toolbar

The Effects toolbar

The Editor toolbar

Glossary

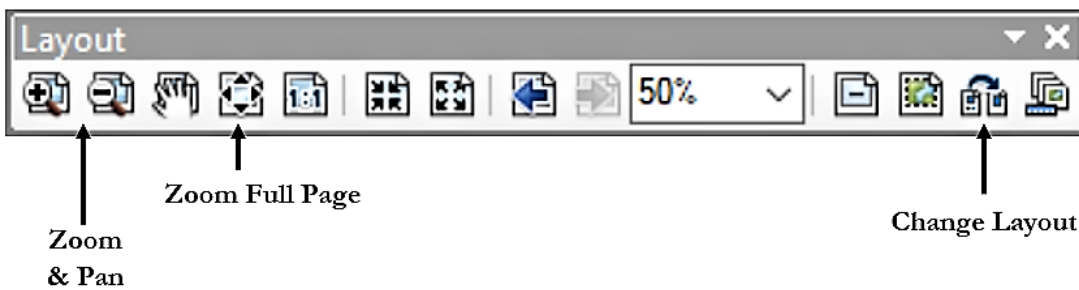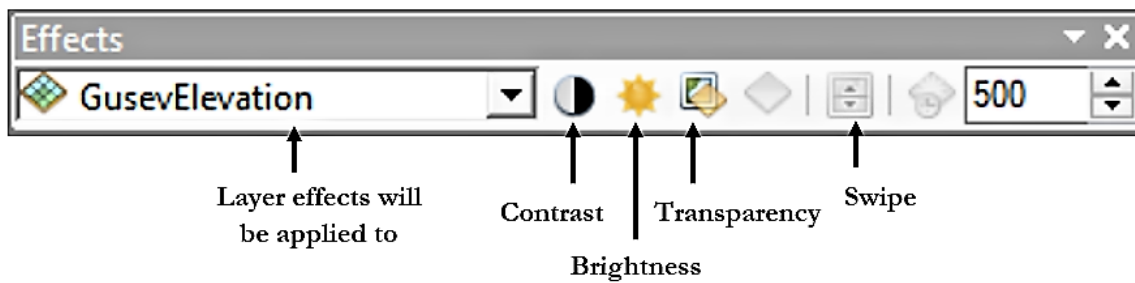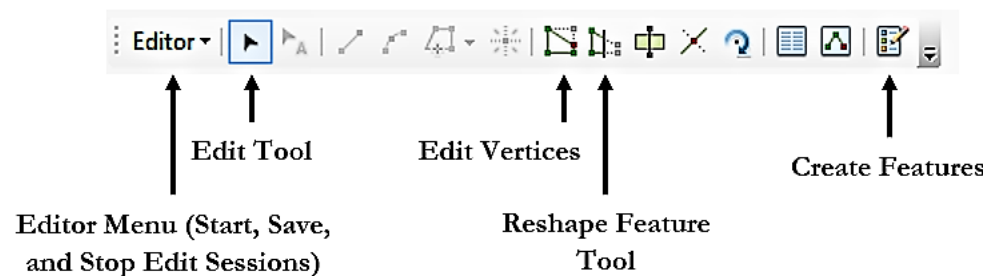* **Attribute Table:** a table that stores non-spatial information about features in a feature class (or statistics on pixel values in a raster), more columns can be added to associate additional data with features (only for feature classes, not rasters)

* **Average Nearest Neighbor:** a tool that calculates the nearest neighbor index from the average distance between each feature and its next neighboring feature

* **Basemap:** a raster depicting background reference information onto which other layers, either from rasters or feature classes, are placed

* **Buffer:** a tool for creating a zone around a map feature a specified distance from the edge of the feature, output is a polygon feature class, distance can be negative to create a smaller zone within a feature (not available in earlier versions of ArcGIS Desktop)

* **Cell Size:** the spatial resolution of a raster, i.e. the physical size of a pixel on the surface being viewed

* **Construction Tools:** specifies the method by which the user will draw a new feature

* **Data Frame:** a map element that contains one or more layers, all layers in a data frame share a geographic extent and coordinate system, a map may contain multiple data frames but only one frame may be active at a time and only the active frame will be visible in Data View mode in ArcMap

* **Data View:** one of two possible modes for displaying maps in ArcMap, used during analysis and interpretation, certain map elements with no spatial relationship to the data frame (such as legends, titles, scale bars, etc.) are not shown in this mode and are only visible in Layout View, text labels and other objects associated with specific locations on the map are shown in Data View

* **Edit Session:** while in an edit session, changes to features and attributes that alter source data can be made and new features can be created

* **Editor Toolbar:** contains tools used to start and stop editing sessions and edit data during an editing session

* **Feature Class:** a vector data file used specifically by ArcGIS to store geometric features and attributes associated with them, analogous to shapefiles used thoughout GIS platforms but with added features for use with ArcGIS tools

* **Feature Dataset:** a collection of feature classes stored together that share the same coordinate systems, extent area, and theme; feature classes with different geometries can be stores in the dame dataset

* **Fields:** the columns in an attribute table which associate a value for a certain property, or other type of information such as a word, thumbnail image, or hyperlink, for all the features in a feature class or shapefile

* **Geodatabase:** contains a file structure for organizing data such as feature classes, rasters, and tables; the structure can only be properly viewed within ArcCatalog, as its schema and file types are not recognized by other data viewers such as Windows Explorer or Mac Finder

* **Hillshade:** a feature that uses elevation data from a raster to simulate the terrain with shadows due to a light source

* **Hot Spot Analysis:** a tool used to visualize statistically significant spatial clusters of high values (hot spots) and low values (cold spots) of a given numerical attribute within a feature class

* **Intersect:** a tool for creating a new feature class from two or more existing polygon feature classes, which creates

polygon features based on the areas where features in the existing feature classes overlap; attributes from all input features are included in the attribute table of the output feature class' attribute table

* **Layer:** on a map; layers can also define additional properties, such as which features from the data source are included a component of a map document that provides information on how to display data from a given source file; can be stored as a file and used to display other similar source files; layers appear in the Table of Contents window in ArcMap

* **Layout View:** one of two possible modes for displaying maps in ArcMap, used after analysis is complete for creating a finished map product for publication; in this mode map elements can be created and modified, such as titles, legends, and scale bars and data frames can be moved and resized on the page; all data frames are visible, but as with Data View only the active frame can be manipulated

* **Map Document:** a file that contains information for how to display spatial data, such as feature classes and rasters; contains one or more data frames, each of which contain one or more layer; contains no source data, and must be saved as a Map Package in order to include source data in the file

* **Metadata:** information associated with a data file, such as source, authors/owners, keywords, coordinates, and previous processing; can be edited by any user in ArcCatalog

* **Overlay:** a set of processing tools, such as Intersect and Union, that create new feature classes from the overlapping of existing features

* **Query:** a logic expression that describes a subset of features within a feature class by their properties; typically used to select features that make the expression true

* **Raster to Polygon:** a tool that converts a raster to a polygon feature class by converting areas of equal cell value into polygon features

* **Raster:** an array of cells (pixels) each possessing a numerical value and a spatial coordinate; image files of all common types can be loaded in ArcMap and spatial data can be added through georeferencing to existing rasters covering the same geographic area

* **Selection:** a subset of features from a feature class isolated for analysis, often created by using a query but also can be created by hand using the Select Features tool on the Tools toolbar

* **Snapping:** an adjustable feature of editing that allows for exact matching of position to an existing part of a feature, such as a vertex or edge, when the mouse is moved to within a specified distance, or tolerance, of the object

* **Spatial Analyst Toolbar:** provides advanced analysis tools for use on both rasters and vector data

* **Streaming:** a feature used in digitizing (drawing by hand) polylines and polygons in which vertices are added automatically at regular defined intervals as the mouse is moved

* **Symbology:** controls how the data are displayed in ArcMap, such as color, icon size, line width, continuous vs. discrete, etc.; symbology information is stored in layer files and map documents

* **Union:** a tool for creating a new feature class from two or more existing polygon feature classes, which creates polygon features based on the areas occupied by any features in the existing feature classes; attributes from all input features are included in the attribute table of the output feature class' attribute table

* **Vector:** a geometric object, such as a point, line, or polygon, defined by the exact locations and sizes of defining properties, such as end points and lengths; as vectors do not depend on arrays of cells, but rather by pure geometry, they have effectively infinite resolution when being displayed