Surface Properties by Geometric Element

The Surface Properties by Geometric Element process (Geometric / Attributes / Surface Properties) computes surface property statistics from a surface raster for lines or polygons in a geometric object (vector, CAD, or shape). You can choose to compute statistics on elevation, slope, aspect, and other surface properties. The statistics can be saved as tables added directly to the geometric object, as tables added to a copy of the object, or as text (CSV) files. Surface statistics can be tabulated using:

- all elements or only those marked in the process's View window
- individual elements and/or elements grouped by value in a designated attribute field.

Geometric Object Controls

Press the Select pushbutton in the Geometric Object box to select the geometric object to use. The selected object is automatically shown in the separate View window. Use the Elements icon buttons (Line or Polygon) to choose the element type to use for computing the properties. The *Use* radiobuttons to the right of these buttons set whether to use *All* elements or only those *Marked* in the View. Use the Output menu to choose how to save the statistics: *Add table(s) to object*, *Copy object and add table(s)*, or *Text file(s)*.

You can choose one or both of the *By Element* and *By Attribute* options. The By Element option compiles statistics independently for each element. With this option you can choose an ID or Name to embed in the statistics table(s) to identify each record. The choices are None, Element Number, [Element]_ID.Current (if the element has an ID table) and Choose; the latter option prompts you to select a database table and field associated with the polygons to provide the ID.

The By Attribute option tabulates statistics by grouping elements that have the same value in an attribute field you select. When you choose this option you are automatically prompted to select the table and field to use. You can press the Choose pushbutton to reset this choice if needed. The selected attribute is included as a field in the resulting statistics table.

Surface Controls

Use the Select button in the Surface box to choose an elevation or other continous surface raster from which to compile the surface properties. The surface object is automatically displayed in the View. You can enter an elevation value in the *Volume reference elevation* field to be used in conjunction with the *Volume Below* and *Volume Above* properties for polygons.

Statistics

The Statistics box lists the available statistical measures for the selected element type with a checkbox allowing you to select or deselect each. Pushbuttons allow you to Set All or Clear All selections. For lines you can compute minimum, maximum, and mean values of elevation and slope, along with surface length and percent coverage. For polygons you can compute minimum, maximum, and mean values of elevation and slope, mean aspect, area percent coverage, and surface area. Two measures of surface roughness are provided: elevation standard deviation, and the area ratio (ratio of 3D surface area to 2D planimetric area). The *Volume Above* and *Volume Below* options compute volumes relative to the specified reference elevation. The various Border options compile line statistics using the borders of the polygons. You can choose the units to use for the surface property measures by pressing the Preferences icon button and choosing Units to open the Units window (see illustration to the right). The *Save parameter table* option on the Preferences menu saves a table recording the volume reference elevation when you compute the Volume Above or Volume below measures.

Surface statistics available for line elements.
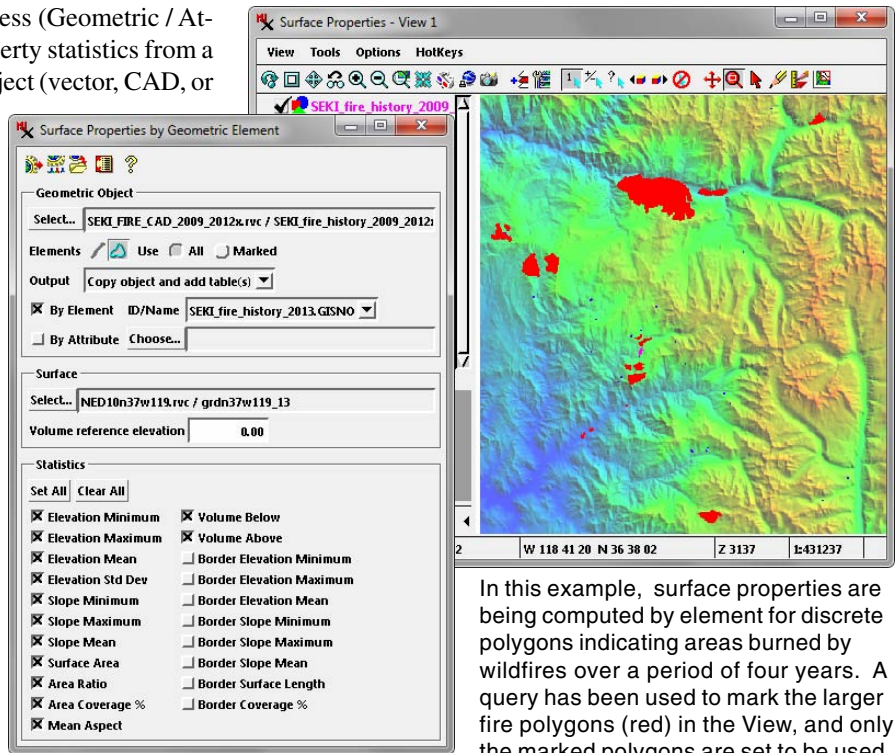
In this example, surface properties are being computed by element for discrete polygons indicating areas burned by wildfires over a period of four years. A query has been used to mark the larger fire polygons (red) in the View, and only the marked polygons are set to be used.
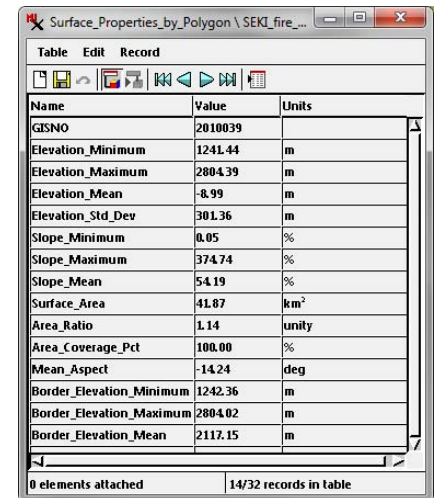
Single-record view of resulting surface properties table with the record for one of the selected polygons.
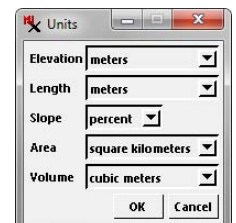
Press the Preferences icon button and choose Units to choose surface measurement units.