

Instructions for using the Symbols tools

Symbols is a web-based tool that uploads a spreadsheet of geologic point data for a field area and outputs a Google Earth KML file with field data points depicted as dots (for locations with no orientation data), strike and dip symbols (for planar orientation data), or arrows (for lineation data). Symbols can be color coded by unit/formation as desired.

There are two versions of the Symbols tool. The original version (v1) takes a generic CSV spreadsheet file with point data and allows the user to assign headers to columns with Longitude, Latitude, Unit/Formation, Symbol Type, Color, etc. This tool can be used for any field data downloaded from a mapping app, which is then converted to a CSV file. See the end of this document for more information.

Using the Symbols for StraboSpot (v2) tool

The newer version (v2) of the Symbols tool, Symbols for StraboSpot, takes an XLS file downloaded from StraboSpot.org as the input file for generating 3D orientation symbols for Google Earth. The StraboSpot Symbols tool can be found here:

<https://educ.jmu.edu/~whitmesj/GEODE/symbols2/>

Symbols for StraboSpot assumes that the XLS file will be in a standard StraboSpot format and assigns the columns in that order; see the image below for a StraboSpot XLS file uploaded into the StraboSpot Symbols tool.

Symbols for StraboSpotInstructions

TableMap

Instructions

Symbols inputs a StraboSpot xls file of structural data from field stations and outputs a Google Earth KML file with inclined orientation symbols.

Choose File

Export to KML

Setting for export

Symbol length [in]50Symbol height [in]25Symbol line thickness6Filenamedata

Altitude

This will use the 'Altitude(m)' column in your spreadsheet to set the geometry's altitude mode to 'absolute' elevation where altitude values are available, and to 'relative to the ground' where they are not.

☐ Use altitude column

Group symbols to folders by

☐ Unit/Formation☐ Location

Tag Colors

Tag Ellsworth Fm.#e1212aTag Greenland Gap Gp.#ee99faTag Hampshire Fm.#9b333dTag Oswego Fm.#73557fTag Price Fm.#0eddcfTag Redoxville Fm.#2eeebcTag Tuscarora Fm.#1d8af0Tag Brallier.#9bc4e8Tag Undesignated spots.#50440f

Master ColorDefault

Export

Total Rows 168

Cell text color for selected headers: probably ok, invalid, OK

Name	Date	Self	Notes	Real World Coordinates	Pixel Coordinates	Latitude	Longitude	Altitude(m)	Planar Orientation Strike	Planar Orientation Dip	Planar Orientation	Planar Feature Type
Unnamed2	2022-05-04T23:58:49.000Z	https://strabospot.org/db/feature/16517087297087	Hampshire outcrop on southeast side of dam, with subhorizontal bedding	POINT (-79.08814315691505 38.56087877884373)		38.560878778844	-79.088143156915	607.83773422241	44	5	bedding	
Unnamed3	2022-05-05T00:02:31.000Z	https://strabospot.org/db/feature/16517089514783	Along Rt. 33. Cross beds here.	POINT (-79.084604 38.564548)		38.564548	-79.084604		178	16	bedding	

In the image above, sample columnar data from the XLS file is shown at the bottom, but note that more columns extend beyond the right margin of the image. The user should make sure that the column headers as listed in Symbols match the columns in the XLS file; headers for columns in Symbols can be reassigned/rearranged as necessary. Rows without outcrop data (such as rows with column headers) can be deleted using the trash can to the left of the row.

Once a StraboSpot XLS spreadsheet has been loaded into Symbols, the user has several options for formatting the orientation symbols in the KML file that will be generated. Under the “Export to KML” header there are options for adjusting the length (size) of the symbol, the height of the symbol above the ground or altitude setting, the symbol line thickness, and the name of the KML file that will be exported. If desired, users can also group symbols in KML folders based on Unit/Formation. These options are the same as those in the original version (v1) of Symbols. It often takes several iterations to determine the preferred settings for a given dataset.

Additional options available in Symbols for StraboSpot include grouping field locations with both planar and linear data into a single KML placemark (instead of two separate KML placemarks.) Units highlighted with a “Tag:” feature in StraboSpot are shown under the “Tag Colors” header, with default colors assigned for each unit. Users can click on a color box to assign a new color or a new hex color code, or a single color can be applied to all units via the “Master Color” box at the bottom.

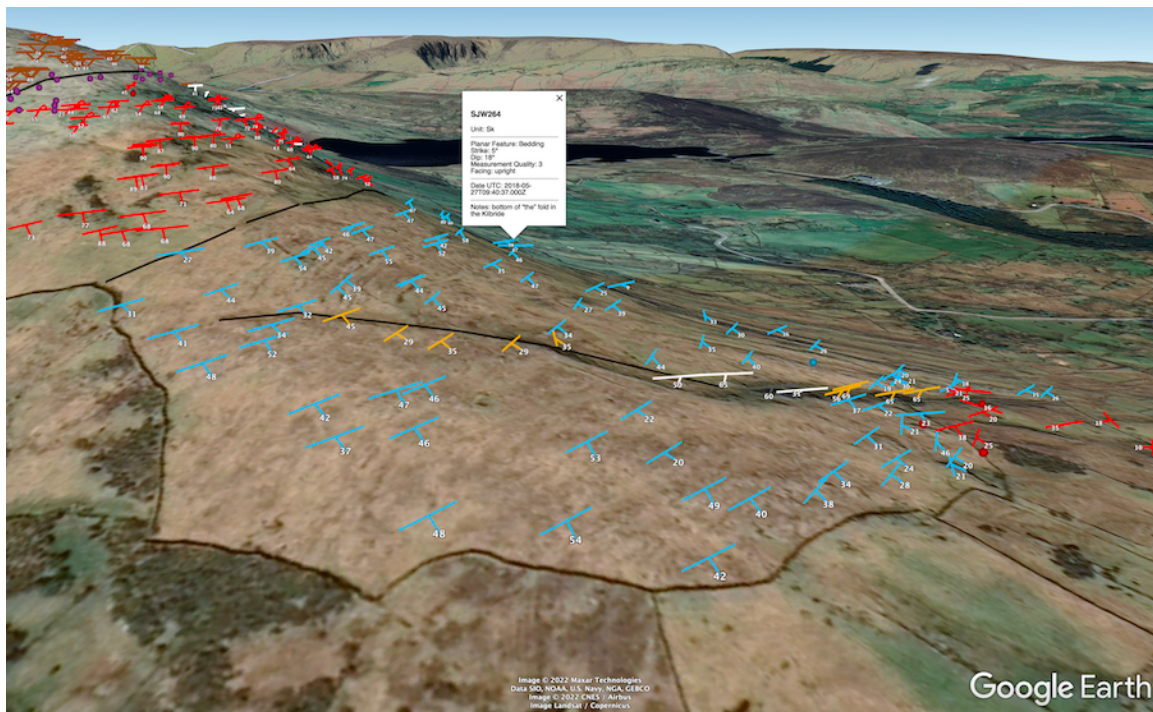
Symbols for StraboSpot plots data points “Relative to ground” in the KML file by default, except for lines and polygons which are plotted “Clamped to ground”. The symbol will be positioned at a height above the ground level as defined by the “Symbol height” setting. However, the StraboSpot app can assign an altitude (elevation above sea level) to each point location if the GPS tool in the app is used to collect location information. Symbols for StraboSpot includes an option to use the altitude information in the XLS “Altitude” column, so that the KML placemark plots the elevation as “Absolute”, using the value in the altitude column plus the “Symbol height” setting. If the altitude cell is blank, the orientation symbol is plotted “Relative to ground”.

One important caveat is that the GPS elevation collected by the StraboSpot app rarely matches the altitude for a given latitude and longitude point in the Google Earth/Google Maps DEM. One way to correct for this discrepancy is to query Google Earth to find the DEM elevation for a given latitude and longitude. You can do this by going to a desired location in Google Earth and then reading the “elev” data from the bottom right corner of the GE window and then updating your XLS file with the altitude data for each of your points. However, if you have many data points, you can automate the process in Symbols for StraboSpot if you have a Google Maps API key. If “Use altitude column” is selected in Symbols, the user has the option of entering their personal Google Maps API key in a field that appears below the “Use altitude column” button. If a valid API key is entered, elevation data from the Google Maps DEM will be used for all points that have latitude and longitude information.

Information about obtaining a Google Maps API key can be found here:

<https://developers.google.com/maps/documentation/javascript/get-api-key>

Once the desired Symbols options have been selected for an uploaded XLS file, clicking the “Export” button will produce a KML file that will be downloaded to your desktop (or where-ever your downloads are typically saved.) When opened in Google Earth, this KML file will display the field data from the XLS file as 3D orientation symbols (*e.g.* bedding, foliation, lineation) or as dots for data points with no orientation information. Data points that feature horizontal bedding, vertical bedding, or overturned bedding plot with the appropriate specialized symbology. If the XLS file includes lines and/or polygons, these will be shown clamped to the Google Earth ground surface, with the color indicated in the box for the “Undesignated spots” Tag. Polygons are filled at 50% transparency. Clicking on a feature in Google Earth will cause a pop-up balloon to appear with information, such as the unit name, the type of feature, any orientation measurement information, the UTC date and time when the data was collected in StraboSpot, and any notes recorded in the StraboSpot XLS file.



Field data shown as oriented 3D symbols in Google Earth.

KML files created by the Symbols for StraboSpot tool can be used as the field data for building geologic maps in Google Earth. More information about how to create geologic maps using Google Earth is available by downloading the document from the link below:

<https://educ.jmu.edu/~whitmesj/GEODE/Creating GE Geologic Maps.pdf>

Using the Symbols (v1) tool

The original (v1) Symbols tool can be found here:

<https://educ.jmu.edu/~whitmesj/GEODE/symbols/>

On the Symbols webpage, click on the “Choose File” button and select your CSV file. When your CSV file is loaded you will see a table of your data at the bottom of the screen. See the image below for an example of a CSV dataset uploaded to Symbols (not all of the dataset is shown in the image.)

Symbols

TableMap

Instructions

Symbols inputs a CSV file of structural data from field stations and outputs a Google Earth KML file with inclined orientation symbols. 3D symbols are positioned above the Google Earth landscape based on the parameters below. It is suggested that your CSV file has columns for each of the parameters below, but the only columns that are required are Latitude, Longitude, and Unit/Formation.

Parameters (columns in CSV file)

- **Name for Point:** the title for a field location or station; defaults to Unit/Formation name if not provided in CSV file
- **Longitude:** in decimal degrees (required)
- **Latitude:** in decimal degrees (required)
- **Unit/Formation:** unit or formation name (required)
- **Symbol Type:** type of symbol drawn in GE; can be bedding, foliation, lineation; defaults to a dot if not provided in CSV file
- **Symbol Color:** color of the symbol drawn in GE; defaults to black if not provided in CSV file. [Color Chart](#)
- **Strike or Trend:** direction of strike (or trend if a lineation)
- **Dip or Plunge:** amount of dip (or plunge if a lineation)
- **Dip Direction:** cardinal direction of the dip line (N,S,E,W); right hand rule is assumed if there is no column for Dip Direction in CSV file
- **Notes/Observation:** any Notes are added to the pop-up bubble when a symbol is clicked in GE

Choose File

Export to KML

Setting for export

Symbol length [m] 50 Symbol height [m] 25 Symbol line thickness 6 Filename data ☐ Group symbols to folders by Unit/Formation

Export

Total Rows 63 **Invalid Rows 63**

Cell text color for selected headers: probably ok, invalid, OK

Name	Longitude	Latitude	Unit/Formation	Symbol Type	Symbol	Strike	Dip or	Dip Dir	Notes	Planar Orientation Strike	Planar Orientation Dip	Planar Orientation Quality	Planar Orientation Label	Planar Orientation Planar Feature Type	Planar Orientation Facing	Unit	color
Mathias cut	2019-08-12T12:50:35.000Z	https://strabospot.org/db/feature/15656142356582		POINT (-78.861282 38.885907)		38.885907	-78.861282	490.52	204	42	5		planar feature 204	bedding		Brallier	brown
1.57E+13	2019-08-12T13:26:41.000Z	https://strabospot.org/db/feature/15656164013867	1st stop on Corridor H at Baker heading west	POINT (-78.74299999999999 39.047162)		39.047162	-78.743	457.3	218	78	5		bedding 218	bedding		Brallier	brown
1.57E+13	2019-08-12T13:42:55.000Z	https://strabospot.org/db/feature/15656173750885	Mile 120.0	POINT (-78.755245 39.050235)		39.050235	-78.755245	480.55	222	78	5		Dgg	bedding	upright	Greenland Gap	orange

Many of the columns initially displayed in Symbols are unnecessary and will need to be deleted. The only important columns are those with data for: Notes/Observation, Latitude, Longitude, Strike, Dip, Symbol Type, Unit/Formation, and Symbol Color. You will need to click on the trash cans above each column to delete unwanted columns, and then set the category label below the trash can in each remaining column to the appropriate data category. Rows without outcrop data also should be deleted using the trash can at the left of each row. These are typically the header row(s) in a spreadsheet, but can also include rows with field data that are lines (e.g. contacts, faults) or polygons.

The image below shows a portion of the example data table after it has been formatted correctly in Symbols. Note that all of the red (invalid) text is now displayed as gray or green text.

Symbols

Table

Map

Instructions

Symbols inputs a CSV file of structural data from field stations and outputs a Google Earth KML file with inclined orientation symbols. 3D symbols are positioned above the Google Earth landscape based on the parameters below. It is suggested that your CSV file has columns for each of the parameters below, but the only columns that are required are Latitude, Longitude, and Unit/Formation.

Parameters (columns in CSV file)

- Name for Point:** the title for a field location or station; defaults to Unit/Formation name if not provided in CSV file
- Longitude:** in decimal degrees (required)
- Latitude:** in decimal degrees (required)
- Unit/Formation:** unit or formation name (required)
- Symbol Type:** type of symbol drawn in GE; can be bedding, foliation, lineation; defaults to a dot if not provided in CSV file
- Symbol Color:** color of the symbol drawn in GE; defaults to black if not provided in CSV file. [Color Chart](#)
- Strike or Trend:** direction of strike (or trend if a lineation)
- Dip or Plunge:** amount of dip (or plunge if a lineation)
- Dip Direction:** cardinal direction of the dip line (N,S,E,W), right hand rule is assumed if there is no column for Dip Direction in CSV file
- Notes/Observation:** any Notes are added to the pop-up bubble when a symbol is clicked in GE

Choose File

Export to KML

Setting for export

Symbol length [m]

50

Symbol height [m]

10

Symbol line thickness

6

Filename

data

Group symbols to folders by Unit/Formation

Export

Total Rows 62

Cell text color for selected headers: probably ok, invalid, OK

	Notes/Observation	Latitu...	Longit...	S...	D...	Sym...	Unit/Forma...	Sy...
		38.885907	-78.861282	204	42	bedding	Brallier	brown
	1st stop on Corridor H at Baker heading west	39.047162	-78.743	218	78	bedding	Brallier	brown
	Mile 120.0	39.050235	-78.755245	222	78	bedding	Greenland Gap	orange
	large cross beds, purple-red	39.052011	-78.766251	220	56	bedding	Hampshire	red
	along side road. Lots of channels / big scours - crevasse splays? oxbows?	39.052041	-78.770007	220	35	bedding	Hampshire	red

When you have formatted your data in Symbols, create a KML file for Google Earth by clicking on the “Export” button. You can change some parameters for the orientation symbols in the KML file, such as the length, height above the ground, and line thickness. You can also specify a filename for the KML file. After clicking the “Export” button, you should have a KML file on your desktop (or where-ever you saved it) that can be opened in Google Earth. This KML file contains your field data as orientation symbols or dots. Clicking on a symbol or dot in Google Earth will cause a pop-up balloon to appear with information about the unit or formation, the symbol type, any orientation measurement information, and any Notes or Observations recorded in the spreadsheet.

KML files created by the Symbols tool can be used as the field data for building geologic maps in Google Earth. More information about how to create geologic maps using Google Earth is available by downloading the document from the link below:

<https://educ.jmu.edu/~whitmesj/GEODE/Creating GE Geologic Maps.pdf>