



GLImports Operation Manual

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GeoLab 2020 custom import tool

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Introduction

The Geolab2020 import tool is designed to facilitate and streamline the import of user data, giving the user freedom to determine the exact format of their inputted data.

This greatly reduces the time which would typically be spent manually formatting data to use within GeoLab, and provides a tool to create, use, and share common file formats amongst other GeoLab users.

Overview

Usage

The GLImports tool has a simple and rigorous design which allows a user to create individual import tools and re-use methods between tools to copy and create import methods for similar datatypes.

The process for creating and using an import tool using the GLImports tool is outlined below:

1. Use a new or existing folder using the interface, where each folder represents an import tool.
2. Add "Import Rules" to the import tool. Each import rule is a small ".glm" file which tells GLImports how to go about importing a particular datatype.
3. Edit each .glm file using the interface, to specify the data format each import rule will handle within a given import tool.
4. Once all desired import rules have been added, use the import tool to import one or multiple files of the expected datatype. These will be added automatically to GeoLab's Assistant tab and the active project, or to a list of files if accessing the import tool from the "New Project Wizard" on the Setup tab.

Import Tool

Folder of .glm files created at a desired location, which handles the import of external data according to the formats specified by each .glm file.

.glm files are executed in alphabetical order within each import tool.

Import Rules

.glm extension plaintext file created using the GLImports interface. Each file specifies a data block within another external text file (which is the file to be imported). Import rules handle a block of data with a designated starting and ending line (from the top of the page down), containing user-specified text.

Warning: do not set the starting or ending lines of two separate .glm files within an import tool to the same value.

Import tools read data within each block based on specified field locations (by column and width), or by delimiter. The tool reads line-by-line, and can interpret data in a variety of formats based on the datatype.

For a more comprehensive look at how the tool handles different datatypes, samples of each datatype have been provided in a delimited and a fixed-width format in the GLImports folder.

Each field on a line is provided with a relevant name to the specified datatype, and if a field is left undesignated by the user or is left with a name that does not match the relevant fields, it is ignored.

Group Specifics – Available Datatypes

Important note on latitude and longitude values:

Latitude and longitude values can be given to GLImports as decimal, “degree/minute/second”, “degree|minute|second”, and “degree minute second” formats. GLImports will automatically detect the input format, and there is no need to explicitly specify the format.

Coordinates

Basic coordinate records. Can be used to form 2DD, 2DC, 3DD, and 3DC observation groups in conjunction with a matrix.

- NE
 - Northing, Easting. 2D coordinate record.
- NEH
 - Northing, Easting, Ellipsoidal Height 3D coordinate record
- NEO
 - Northing, Easting, Orthometric Height coordinate record
- PL
 - Latitude, Longitude 2D coordinate record
- PLH
 - Latitude, Longitude, Ellipsoidal Height 2D coordinate record
- PLO
 - Latitude, Longitude, Orthometric Height 3D coordinate record
- XY
 - Local X-Coordinate, Local Y-Coordinate 2D coordinate record
- XYZ
 - X-Coordinate, Y-Coordinate, Z-Coordinate 3D coordinate record
- ASTR
 - Astronomic Latitude, Astronomic Longitude 2D coordinate record

Conventional Observations

Conventional observation groups, such as those measured with a level or with a total station.

- ANGL
 - Horizontal angle observation
- AZIM
 - Astronomic azimuth observation
- DIR
 - Direction observation
 - DSET groups will be automatically generated by the GLImports tool when it has detected that the from-observation station has changed
- DIST
 - Spatial marker-to-marker slope distance
- EDIS

- Ellipsoidal marker-to-marker slope distance
- EHDF
 - Ellipsoidal height difference
- EHGT
 - Ellipsoidal height
- GAZI
 - Geodetic azimuth
- GVAN
 - Geodetic vertical angle
- GZAN
 - Geodetic zenithal angle
- OHDF
 - Orthometric height difference
- OHGT
 - Orthometric height
- VANG
 - Vertical angle
- ZANG
 - Zenithal angle

Coordinate and Coordinate Difference Observations

Single-line observation groups.

- DXYZ
 - X, Y, and Z coordinate difference observations.
 - Can also be used to form 3DD observation groups with a matrix
- 2DD
 - NE, PL, XY options for single-line 2DD groups, dependent on coordinate type
- 3DD
 - NEH, NEO, PLH, PLO, XYZ, DXYZ, coordinate type options, for single-line 3DD groups

Multi-Line Matrices

Used to import matrices (covariance, weight, correlation) that span multiple lines of data. These can be imported directly after a coordinate group with a corresponding 2DD/2DC/3DD/3DC header in order to form observation groups.

All matrix .glm rules must be preceded by a coordinate record .glm rule with matching station records. If a name-based matrix is used, GLImports will pick out the proper matrix elements (according to the previous coordinate records) even if irrelevant station matrix elements are included.

- Specified Record Location
 - Row, Column, record, (optional) record, (optional) record
 - The row and column of each record (matrix element) are specified. If two or three elements are provided on each line, GLImports will automatically increment the column number by 1 for each additional element per line

- The first row and column starts at (1, 1)
 - If the Row and Column are both specified as 0, GLImports will treat the line as a header line. All values besides the row, column, and records(s) (eg. Linear units, matrix factors, etc.) need only be specified in the header line.
 - If there is no header line provided, the matrix factors and linear units will be set to default values
- Name-based
 - Station name, XYZ, station name, XYZ
 - Based on the preceding coordinate records, matrix elements are picked out of a list of matrix elements.
 - Matrix elements are given based on their from-station, to-station, and two corresponding component flags (X/Y/Z, N/E/H, P/L/O, 1/2/3)
 - Component flags must contain a character from each of the relevant components which make up each coordinate

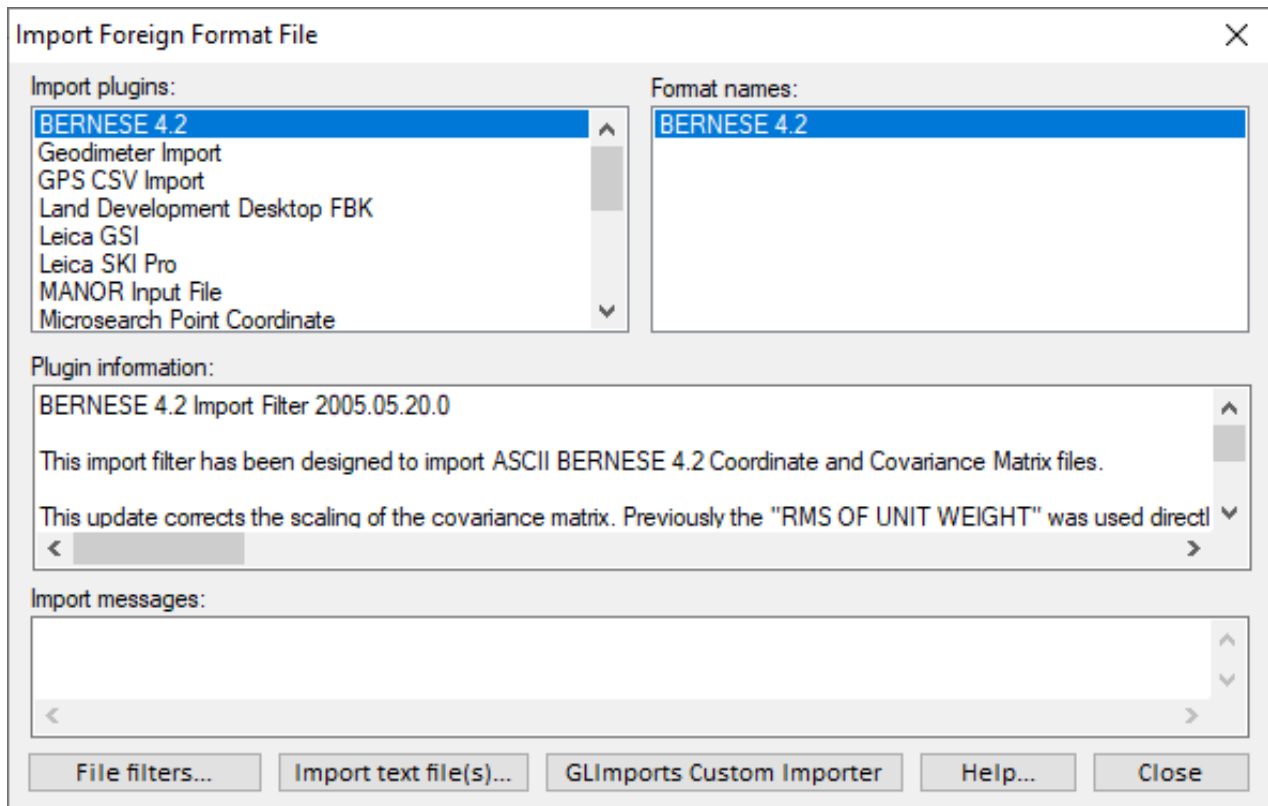
Multi-Line Coordinate Records

Coordinate records spanning multiple lines, where each of the elements (eg. X-Coordinate, Y-Coordinate, Z-Coordinate) are listed on a new line as opposed to being on the same line.

- NE
 - Northing, (newline) Easting. 2D coordinate record.
- NEH
 - Northing, (newline) Easting, (newline) Ellipsoidal Height 3D coordinate record
- NEO
 - Northing, (newline) Easting, (newline) Orthometric Height coordinate record
- PL
 - Latitude, (newline) Longitude 2D coordinate record
- PLH
 - Latitude, (newline) Longitude, (newline) Ellipsoidal Height 2D coordinate record
- PLO
 - Latitude, (newline) Longitude, (newline) Orthometric Height 3D coordinate record
- XY
 - Local X-Coordinate, (newline) Local Y-Coordinate 2D coordinate record
- XYZ
 - X-Coordinate, (newline) Y-Coordinate, (newline) Z-Coordinate 3D coordinate record
- ASTR
 - Astronomic Latitude, (newline) Astronomic Longitude 2D coordinate record

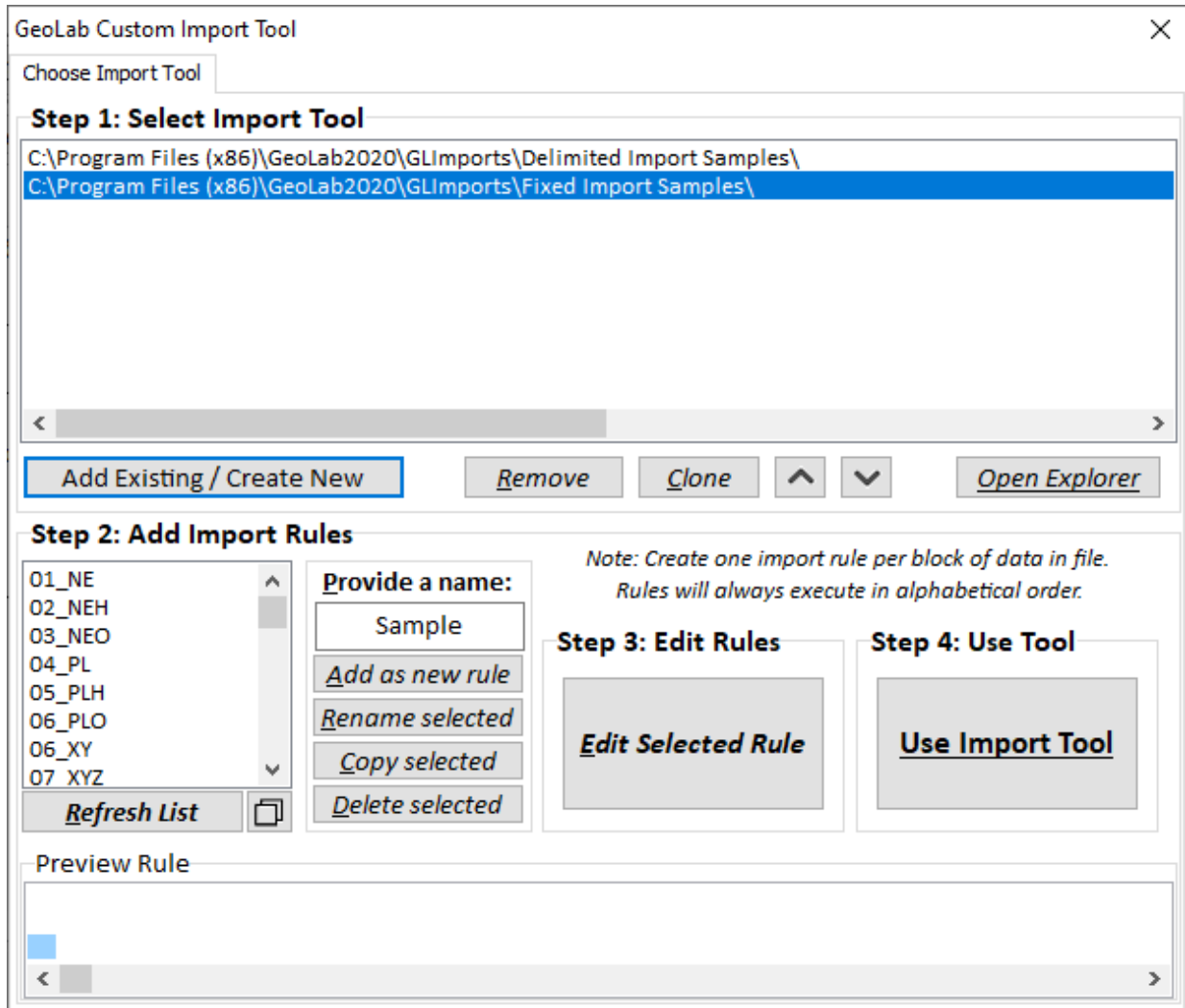
Features and Usage

Accessing the GLImports tool



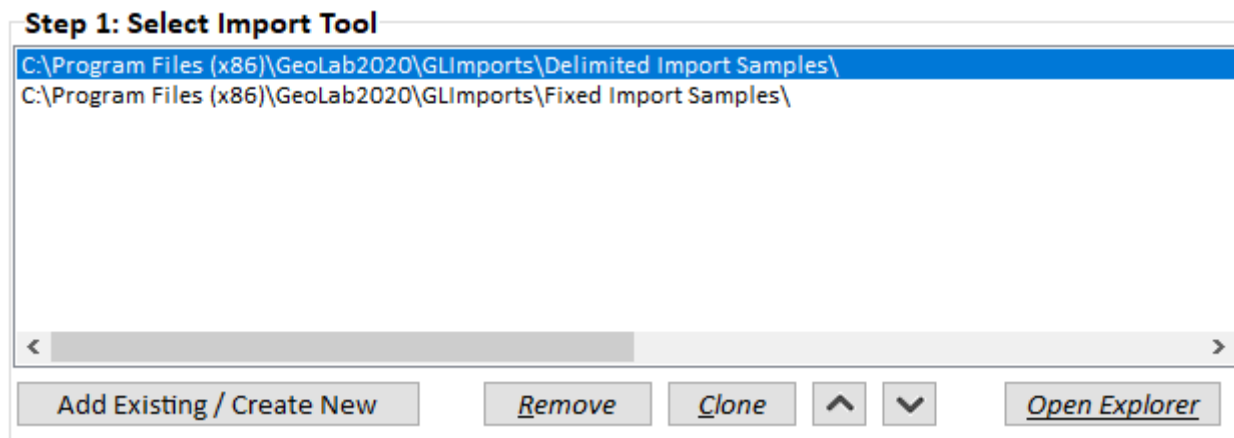
Navigate to the Project/Assistant/File/Import button, to access the classic GeoLab imports window. From here, click the "GLImports Custom Importer" button to access the main window of the import tool.

GLImports Main Window



From here, an import tool can be created.

Import Tools Box



Import tool window, showing datatype samples in fixed and delimited format.

Add Existing / Create New

Use the “Add Existing/Create New” button to create a new import tool folder or select an existing folder to use as an import tool.

Remove **Clone** **^** **v**

Use the “Remove” button to remove an import tool from the list. This does **not** delete the import tool.

Use the “Clone” button to duplicate an import tool with all its rules.

Use the up and down arrow buttons to move an import tool within the list.

Open Explorer

Use the “Open Explorer” button to open the Windows file explorer, pointed at the current import tool directory.

Import Rules Box

Import rules list, showing sample rules from the delimited datatypes sample tool.

Add as new rule

Add the text specified above as a new import rule.

Rename selected

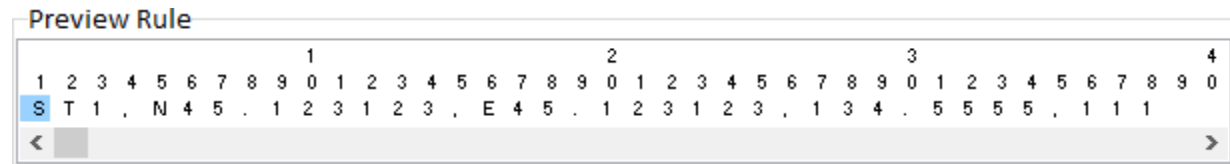
Rename the selected rule to the text specified above.

Delete selected **Copy selected**

Copy or delete the selected rule. Deleting will permanently delete the .glm file from the user's computer.

Refresh List

Refresh the contents of the selected import tool, showing any new rules added via the Windows Explorer.



Display the format of a given import rule, based on the column number of each character in a given line. The column number is less important for delimited rules, but this gives a visualization of each rule regardless.

Quick trick: to create quick fixed-width rules, first create them in a delimited format and provide sample values pertaining to the width of each field. After all fields have been specified, change the format to fixed width and each field will retain its width.



Expand the rule to preview it in a larger window with a modifiable text size value.

Edit Selected Rule

Also accessed by pressing the “enter” key while in the rules list or by double-clicking on a rule, this brings up the rule editing window.

Use Import Tool

Also accessed by double-clicking an import tool, this prompts the user to select one or more files to import using a selected import tool.

Import Rule Editor

Records

The “Format” box allows for a Delimited or Fixed-Width format to be selected. Individual rules within one import tool may have different formats and delimiters, however this is not possible within the same .glm rule file.

The “Delimiter” box allows for a single character to be designated as the delimiter for a specified line.

Data Block Settings

The above allows a user to specify a datatype from a list of datatypes pertaining to each record type in GeoLab. Available datatypes allow a user to specify coordinates, observations, and observation groups.

The Data Block Start and Data Block End allow for the data block to be specified based on the line beginning and ending the relevant data within a text file.

The GLImports tool will begin reading lines within a file directly after the data block start line, until the line before the data block end line. If GLImports cannot find the data block start line, the data is not read

in. If GLImports cannot find the data block end line, it will continue trying to read all data in the file with a given format and may produce errors.

GLImports will skip any lines between the data block start and end that begin with a “*” character.

Matrix Type

Covariance Correlation Weight

All relevant datatypes, containing a matrix, will prompt the “Matrix Type” box to enable and allow for an option to be selected. The appropriate matrix type will then be used to import the specified data.

Add Observation Group Header

None 2DD 2DC 3DD 3DC

Relevant datatypes will allow for the user to specify an observation group header, which allows for the formation of 2DD, 2DC, 3DD, and 3DC observation groups.

Relevant Fields Box

Relevant Fields

Name	Type	Sample Value	Description
name	String	AFPA_001	Station name character, integer, string, etc
latitude	String	43.722234460N	Station Latitude Coordinate
longitude	String	80.976477410W	Station Longitude Coordinate
flag	String	W	Non-zero char sets point to fixed
layer	Integer	0	Network Layer

The above shows the list of relevant fields to a given datatype. Each datatype prompts the user to specify the location, delimiter or field-wise, within a given line, of each field.

If a given field is not provided by the user, GLImports resorts to the default value of that field. **It is not necessary that every relevant field be specified by the user** within a given data block, however the results of the import may be incorrect depending on the default value of each field.

Necessary fields are those such as station name, latitude, longitude, etc. Unnecessary fields are those such as linear units (default to “m”), layer (default to “0”), flag (default to non-fixed “000”), etc.

Note: GLImports will not check to ensure that imported data makes sense, so incorrectly specified .glm files may import data as default values or values that do not make sense.

Existing Fields Box

Existing Fields

Name	Type	Value
name	String	ST1
latitude	String	N45.123123
longitude	String	E45.123123
flag	String	111

The above shows the list of existing fields as specified by the user. The GLImports tool reads the fields in a simple manner:

- If the name of a field matches the name of a field in the “Relevant Fields” box (**capital letter sensitive**), GLImports will interpret this field based on its designated column and width, or position in a delimited line.
- If the name of a field is not found in the “Relevant Fields” box, it will be ignored.

Use this button to add a new blank field.

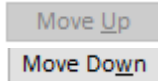
Use this button to copy a highlighted field, creating a new rule identical to its copy.

Also accessed by double-clicking a field or pressing the enter key while a field is highlighted.

Used to bring up the field editor, where each field can be modified. If a rule has a **fixed width** format, the user will be able to specify the start column and width of each field within a line. If a rule has a **delimited** format, fields will be automatically placed in a relevant order within a line, and the start column and width will be automatically populated.

Delimited field start column and width are determined by the length of the “Value” given. These values are irrelevant and are ignored by GLImports, but help for the user’s visualization.

Additionally, sample values can be given in a delimited rule to automatically generate start column and width values. The rule can then be switched to a fixed-width format, as a quick way of establishing these values. This trick is especially useful when fields need to be moved in their order within a line.



Move a field within the order of fields in a given line. “Move Up” moves a field to the left, and “Move Down” moves a field to the right.

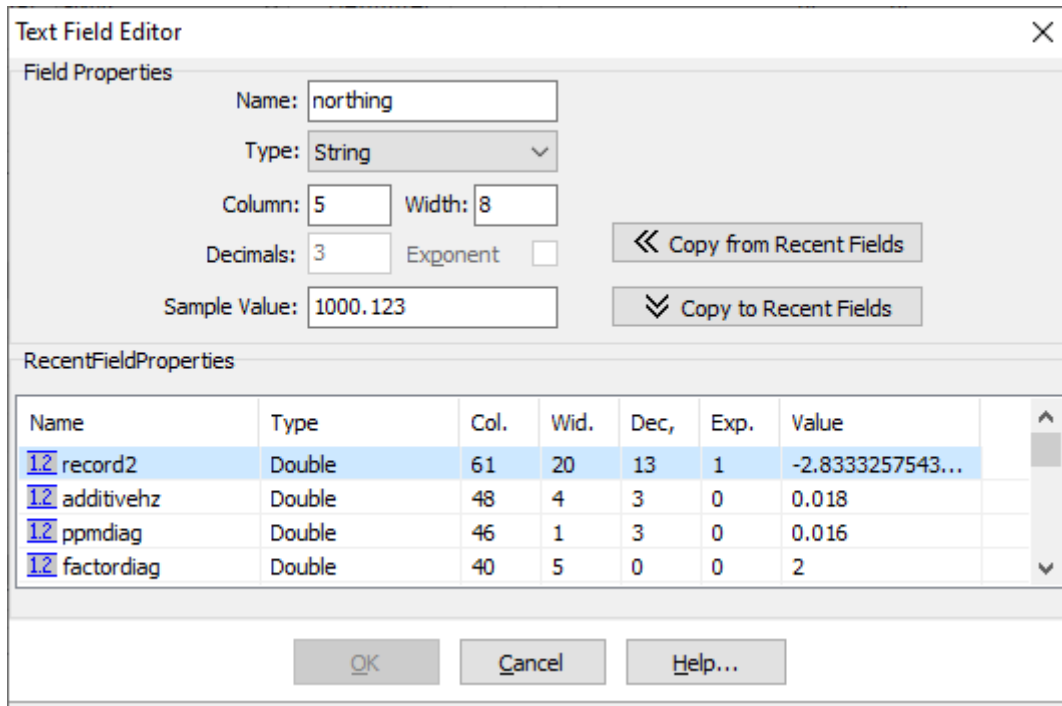


Another sample text line is provided in this dialog. This is useful for visualizing the order and location of delimited and fixed-width fields, and confirming that such values are correct without the need to count manually.

When a field is selected in the “Existing Fields” box, it will be selected in the sample text line.

Column numbers start at 1 and cycle through the single digits. Multiples of tens are shown in the first row, with individual counts within each ten shown in the second row. The import rule is shown in the third row.

Field Editor



Name:

The “Name” field is used to specify the name of a text field. This must match an expected “Relevant Field” to be considered by the GLImports tool. If an unexpected name is found, it is ignored.

Quick tip: random, unrelated names can be used to tell GLImports that certain fields are not needed. This is especially useful in delimited formatted datatypes, where necessary data may be several fields into a text line.

Example:

Data:

3,sat,01/11/2019,AFPA,?,unfixed,5000.122,3021.995,?

GLImports fields:

NULL, notneeded, zzzz, **name**, nope, aaaa, **xcoord**, **ycoord**

If the field “name” is expected and a field is given any of the names “Name”, “NAME”, “namee”, etc., it will not be recognized by GLImports. It is important to follow the expected naming structure shown in the “Relevant Fields” box.

Type:

There are three types available to the user:

- Integer
 - o A simple integer value with no decimal point or fractional components. This can be negative or positive.
- Double
 - o A complex number with a decimal point and any number of decimals, specified by the “Decimals” field.
 - o A double can be provided in “Exponent” format as well, which may contain any of the following to specify exponent:
 - e ex. 2.31e05, 2.31e-05, etc.
 - E ex. 2.31E05, 2.31E-05, etc.
 - d ex. 2.31d05, 2.31d-05, etc.
 - D ex. 2.31D05, 2.31D-05, etc.
- String
 - o Any assortment of characters, including digits.

The field type is ultimately irrelevant to GLImports, as the type of a field is interpreted based on the name of said field.

There may be situations where changing the type of a field is useful, though this is not recommended and may complicate import tool creation. However, the user can rest assured that the import tool will work correctly regardless of whether all the field types are specified correctly.

Column: Width:

“Column” and “Width” are used to specify the location of a field within a line, where the column number “1” is the first column. This is user-specified for fixed-width format, and automatically filled for delimited format, however these values are not of concern when using a delimited format.

Field widths can vary when using a delimited format, however they must all be the same when using a fixed-width format.

Decimals:

Used to specify the number of decimals for a given field. This will only be applied to relevant fields, and is only available for editing when the “Double” type is selected (though the value will not change if it is first set in “Double” type, and the type is then changed to “String”).

Exponent

Used to specify that a number contains an exponent. Certain fields are automatically written as exponential numbers, such as matrix elements.

Sample Value:

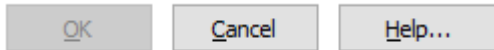
Used to specify the sample value, for the user’s benefit. The length of the sample value is determined by the field width when in a fixed-width format, however when in a delimited format the sample value determines the field width.

Sample values are expected to follow whatever format is expected based on the Integer/Double/String type.

These buttons are used to copy items to and from the “Recent Field Properties” window. Also utilized by double-clicking on a field or a recent field, respectively.

Name	Type	Col.	Wid.	Dec,	Exp.	Value
record2	Double	61	20	13	1	-2.8333257543...
additivehz	Double	48	4	3	0	0.018
ppmdiag	Double	46	1	3	0	0.016
factordiag	Double	40	5	0	0	2

A window showing recent fields, used to copy and paste aspects of a field. This is useful when creating import rules with similar fields.



Use the “OK” button to save the changes to a rule and exit the window.

Use the “Cancel” button to exit the field editor without saving changes.

If you have any problems or questions with the import tool, please feel free to reach out to the following:



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