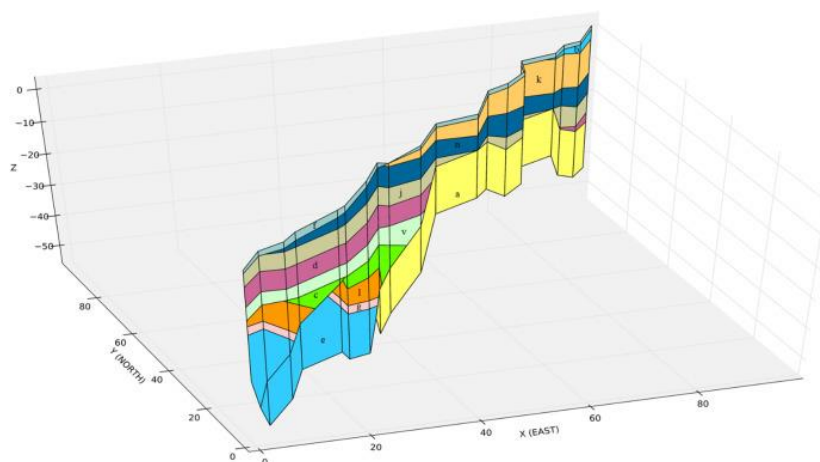


GEOPROPY USER GUIDE

(V 1.0)



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geopropy Python Library

This [repository](#) contains Automatic 3D Geological Cross Section Generation.

For more info, refer to this [article](#).

Package information:

Name: geopropy

version: 1.0

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python: 2.7.*

License: agpl-3.0

<https://github.com/IDAEA-EVS/Geopropy>

Citation:

If geopropy contributes to a project that leads to a scientific publication, please acknowledge this fact by citing:

Hassanzadeh, A., Vázquez-Suñé, E., Corbella, M., Criollo, R., 2022. An automatic geological 3D cross-section generator: Geopropy, an open-source library. Environ. Model. Softw. 149, 105309. <https://doi.org/10.1016/j.envsoft.2022.105309>

```
@article{Hassanzadeh2022, author = {Hassanzadeh, Ashkan and V{\'{a}}zquez-Su{\'{n}}e, Enric and Corbella, Merc{\'{e}} and Criollo, Rotman}, doi = {10.1016/j.envsoft.2022.105309}, issn = {13648152}, journal = {Environmental Modelling and Software}, month = {mar}, pages = {105309}, publisher = {Elsevier}, title = {{An automatic geological 3D cross-section generator: Geopropy, an open-source library}}, url = {https://linkinghub.elsevier.com/retrieve/pii/S1364815222000159}, volume = {149}, year = {2022} }
```

Installation:

Since geopropy uses arcpy, Be sure to install an ArcGIS version that runs python 2.7 (such as 10.5).

Download [geopropy folder](#), place it directly with other libraries where you installed python, or add the folder directory to the Environment path.

Installation also can be done by cloning the repository.

Jupyter Notebook:

To reproduce the synthetic databases, there are [Jupyter notebooks](#) that can be found in 'Examples' repository. In case of problem in semi-automatic stage visualization, execute the commands in terminal.

Instruction manual to complete the new tables added to HYDOR

Database:

change in Borehole_(Sub)Units/Lithology table

In points that there is a fault in a borehole, Top_Depth and Bottom_Depth have to be equal, and same as the depth of the fault point. the (Sub)Units field have to be chosen as 'fault'.

Borehole_Chronopriority

***priority_number.* (mandatory)**

The number that shows the chronological sequence on the geological structures in a way that priority_number equal to one is the oldest structure and the highest priority_number is the newest structure

***type.* (mandatory)**

Structures compatible to process in this application are normal, intrusion, fault (diverse forms) and discordancy. For each one the mentioned structure, the table have to be complete in a specific way:

- normal
 - top_layer: (mandatory)
 - bottom_layer: (mandatory)
- intrusion
 - top_layer: leave empty (blank) - (mandatory)
 - bottom_layer: choose the unit name - (mandatory)
- fault

(information have to be completed in fault_table and Borehole_(Sub)Units

 - top_layer: leave empty (blank) - (mandatory)

-bottom_layer: leave empty (blank) - (mandatory)
- discordancy
 - top_layer: (mandatory)
 - bottom_layer: leave empty (blank) - (mandatory)

preferred_angle. optional

In case additional information about the angle of a layer needed, program will use this angle (in degree).

fault_table

priority_number.

The priorities available to choose in this table, are marked as fault in Borehole_Chronopriority table.

Borehole_ID.

Borehole ID of the fault point

Elevation.

elevation of the fault point

***preferred_angle*: optional**

In case additional information about the angle of a layer needed, program will use this angle (in degrees).

***type*:**

Have to be set to 'fault'

Topo_points

This table saves the available surface points information

***X*:**

x coordination of the surface point

***Y*:**

y coordination of the surface point

***Z*:**

z coordination of the surface point

***priority_num*: optional**

If just the geolocation data of the point is available, this field have to be empty. If the point is a contact point between 2 geological structures, the priority number (indicated in Borehole_Chronopriority table) of geological layer have to be identified here.

***Type*:**

Have to be set to 'Topography'

***Polarity*: optional**

In case the point has priority information, the polaroty of the point has be identified.

***Angle*: optional**

In case the point has priority information, if there is a preferred angle for the surface layers and the connection between them, it can be introduced here.

geopropy help

cross_section method generates geological cross sections in 3D in 3 stages based on the available data

Note: the X coordination of boreholes have to be increasing.

cross_section parameters:

18 parameters

- *Database_dir*

A string to define Hydor geodatabase direction (.mdb)

- *boretemp*

A python list contains borehole ids

- *Lithology_table*

Table in database that corresponds to geological units in boreholes

- *box_bottom_rate*

1.1 (default) optional

- *bottomlength*

15 (default) optional

- *predefined_angle_degree*

45 in degrees (default) optional

- *Merge_Layers*

{False(default),True} optional

- *bottom_box_type*

{'normalbottombox' (default),'ratiobottombox'} optional

- *xshifter*

0.5 (default) optional --Shift borehole x coordination in case it is same as previous borehole by xshifter amount.

- *yshifter*

0.5 (default) optional --Shift borehole y coordination in case it is same as previous borehole by yshifter amount.

- *epsbn_ratio*

0.05 (default) optional --A ratio based on borehole distance for 3D to 2D conversion of the points in boundary of the cross section.

- *eps_ratio*

0.01 (default) optional --A ratio based on borehole distance for 3D to 2D conversion of the points everywhere except in boundary of the cross section.

- *ExtendLine_edit_distance*

5 (default) optional --The maximum distance a line segment can be extended to an intersecting feature.

Refer to `arcpy.ExtendLine_edit` function for more info.

- *TrimLine_edit_dangle_length*

2 (default) optional --Line segments that are shorter than the specified Dangle Length and do not touch another line at both endpoints (dangles) will be trimmed.

Refer to `arcpy.TrimLine_edit` function for more info.

- *Integrate_management_distance*

0.01 (default) optional --The distance that determines the range in which feature vertices are made coincident. To minimize undesired movement of vertices, the `x,ytolerance` should be fairly small.

Refer to `arcpy.Integrate_management` function for more info

- *del_x*

10 (default) optional -- The radius in X axis to project surface point to 3D cross sections

- *del_y*

10 (default) optional -- The radius in Y axis to project surface point to 3D cross sections

- *smooth_2d*

False (default) optional --if true, a smoothed version of 2d cross section will be generated

- *gen_polygons*

True (default) optional --if false, the procedure stops after generating 3d lines! This means 2D cross section is not gonna be generated.

- *developer_mode*

True (default) optional --if false, the error handling is more general and with less details