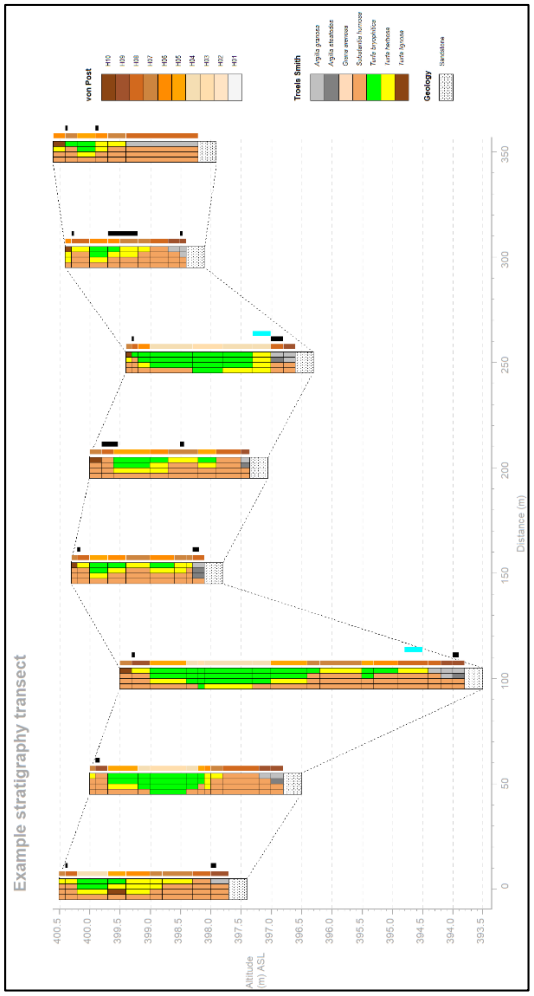
PPSP

Python Peat Stratigraphy Plotter



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2025

1. Introduction

1.1 Background and scope

PPSP is a python-based program used to display peat stratigraphy recorded in the field. It displays multiple cores (2 or more) based on altitude and data primarily from the Troels Smith stratigraphy scheme (Troels Smith 1955), which is used to record changes in certain peat core material. Traditionally, the Troels Smith scheme has been represented by symbols that, to the authors mind, were often hard to decipher and depict when reproduced in a publication. Mixing of symbols seemed to produce a confused display when peat or other material was composed of no single constituent in any defined section. The impetus behind writing this program was to facilitate clear presentation of the authors peat stratigraphy data.

Although stated as being for peatlands the program could be used for saltmarsh or lake sediments. There may be some situations when, for these sediments, the program is limited as the display is largely based on colours rather than symbols. Too many Troels Smith categories may make the choice of colour of paramount importance and potentially lead to detail being less decipherable. For peatlands this is less of an issue, and the user should assess the suitability of this program for their own records. There is potential for adding further functionality to the present program either by the author, or by others with sufficient python knowledge, as the code can be altered (while adhering to the licence supplied with it). The code is predominantly 'functional' in style to compartmentalise the various process in the figures production.

PPSP employs rectangles to represent each of the 25% parts of the total recorded in a Troels Smith assessment. The rectangles are coloured (colours assigned by the user) to represent the Troels Smith properties. The author has used this premise (albeit in black and white) previously (Blundell and Holden, 2014) using a drawing package (Inkscape) but has developed it further here into a program. Some symbols combined with colour are possible for the mineral components.

In the field an operative would examine the core and split the peat (or other core material) into sections of similar constituents and describe the material using the Troels Smith scheme. The scheme has a system of abbreviated Latin terms for various general sedimentary properties and physical properties. PPSP displays the former (Table 1.1a) and, at present, not the physical properties (Table 1.1b) as these, for peat at least, are not especially relevant or informative in practice. These may be more important for lake or saltmarsh sediments, and it is possible to adapt the program for these in the future if required.

The program is run from a terminal emulator in Windows, Mac or Linux machines.

Table 1.1 Sedimentary (a) and physical properties (b) of the Troels Smith system.

a)

	Sh	*Substantia humosa*	Humous substance, homogeneous microscopic structure
I Turfa	*Tb*	*T. bryophytica*	Mosses +/- humous substance
	Tl	*T. lignosa*	Stumps, roots, intertwined rootlets, of ligneous plants
	Th	*T. herbacea*	Roots, intertwined rootlets, rhizomes of herbaceous plants
II Detritus	*Dl*	*D. lignosus*	Fragments of ligneous plants >2mm
	Dh	*D. herbosus*	Fragments of herbaceous plants >2mm
	Dg	*D. granosus*	Fragments of ligneous and herbaceous plants <2mm >0.1mm
III Limus	*Ld*	*L. detrituosus*	Plants and animals or fragments of these <0.1mm +/- humous substance
	Lc	*L. calcareus*	Marl, not hardened like calcareous tufa. Partcles <0.1mm
	Lf	*L. ferrugineus*	Rust, non-hardened. Particles <0.1mm
IV Argilla	*As*	*A.steatodes*	Particles of clay
	Ag	*A. granosa*	Particles of silt
V Grana	*Ga*	*G. arenosa*	Mineral particles 0.6 to 0.2mm
	Gs	*G. saburralia*	Mineral particles 2.0 to 0.6mm
	Gg(min)	*G. glareosa minora*	Mineral particles 6.0 to 2.0mm
	Gg(maj)	*G. glareosa majora*	Mineral particles 20.0 to 6.0mm
	Ptm	*Particulae testae molloscorum*	Fragments of calcareous shells

b)

Degree of Darkness	
nig.4	black
nig.3	
nig.2	
nig.1	
nig.0	white

Degree of Stratification	
strf.4	well stratified
strf.3	
strf.2	
strf.1	
strf.0	no stratification

Degree of Elasticity	
elas.4	very elastic
elas.3	
elas.2	
elas.1	
elas.0	no elasticity

Degree of Dryness	
sicc.4	very dry
sicc.3	
sicc.2	
sicc.1	
sicc.0	water

	Sharpness of Upper Boundary
lim.4	< 0.5mm
lim.3	< 1.0 & > 0.5mm
lim.2	< 2.0 & > 1.0mm
lim.1	< 10.0 & > 2.0mm
lim.0	> 10.0mm

2. Program files

Files for the PPSP program are available from the Zenodo repository where the user downloaded this manual. The latest version listed on Zenodo should be downloaded as updated versions may contain more features or bug fixes. Files in the download are those in displayed in Table 2.1.

Table 2.1. Files provided in initial download of the PSPP program.

Python modules	DESCRIPTION
PPSP_strat.py	Main module containing functions for most of the drawing and error checking
PPSP_build.py	Module to establish correct scaling and limits of the figure based on data provided in the data file
PPSP_colours.py	Module to process and check colour inputs made by the user
PPSP_options.py	Module to obtain and check user preferences from parameter file

CSV Data files	DESCRIPTION
KM_ALL_ALT.csv	Real data from Keighley Moor 9 cores from a stratigraphy survey displayed against altitude (Blundell and Holden, 2014)
KM_ALL_DEPTH.csv	Real data from Keighley Moor 9 cores from a stratigraphy survey displayed against depth (Blundell and Holden, 2014)
KM_C01_05_ALT_.csv	As above, first 5 cores displayed against altitude (Blundell and Holden, 2014)
KM_C01_05_DEPTH_.csv	As above, first 5 cores displayed against depth (Blundell and Holden, 2014)
KM_C01_05_DEPTH_BW.csv	As above but uses shades of grey and black and white and limited symbols
KM_C01_05_DEPTH_UNREC.csv	As KM_C01_05_DEPTH_.csv but with examples of unrecovered sections near surface
FICTITIOUS_ALT_A.csv	Ficticious example data displayed against altitude
FICTITIOUS_ALT_B.csv	Ficticious example data displayed against altitude

CSV parameter files	DESCRIPTION
KM_ALL_ALT_PARA.csv	Parameters for data from KM. Parameters for nine cores from a stratigraphy survey displayed against altitude (Blundell and Holden, 2014)
KM_ALL_DEPTH_PARA.csv	Parameters for data from KM. Nine cores from a stratigraphy survey displayed against depth (Blundell and Holden, 2014)
KM_C01_05_ALT_PARA.csv	Parameters for KM cores 1 to 5 displayed against altitude (Blundell and Holden, 2014)
KM_C01_05_DEPTH_PARA.csv	Parameters for KM cores 1 to 5 displayed against depth (Blundell and Holden, 2014)
KM_C01_05_DEPTH_PARA_BW.csv	As above but uses shades of grey and black and white and limited symbols
KM_C01_05_DEPTH_UNREC_PARA.csv	As for KM_C01_05_DEPTH_PARA.csv but with examples of unrecovered sections near surface
FICTITIOUS_ALT_A_PARA.csv	Parameters for ficticious example data displayed against altitude
FICTITIOUS_ALT_B_PARA.csv	Parameters for ficticious example data displayed against altitude. Parameters chosen show range of display features

Output files	DESCRIPTION
KM_ALL_ALT.eps	Output (.eps) for data from KM for nine cores from a stratigraphy survey displayed against altitude (Blundell and Holden, 2014)
KM_ALL_ALT.png	Output (.png) for data from KM for nine cores from a stratigraphy survey displayed against altitude (Blundell and Holden, 2014)
KM_ALL_DEPTH.eps	Output (.eps) for data from KM for nine cores from a stratigraphy survey displayed against depth (Blundell and Holden, 2014)
KM_ALL_DEPTH.png	Output (.png) for data from KM for nine cores from a stratigraphy survey displayed against depth (Blundell and Holden, 2014)
KM_C01_05_ALT.eps	Output (.eps) for KM cores 1 to 5 displayed against altitude (Blundell and Holden, 2014)
KM_C01_05_ALT.png	Output (.png) for KM cores 1 to 5 displayed against altitude (Blundell and Holden, 2014)
KM_C01_05_DEPTH.eps	Output (.eps) for KM cores 1 to 5 displayed against depth (Blundell and Holden, 2014)
KM_C01_05_DEPTH.png	Output (.png) for KM cores 1 to 5 displayed against depth (Blundell and Holden, 2014)
KM_C01_05_DEPTH_BW.eps	Output (.eps) for KM cores 1 to 5 displayed against depth (Blundell and Holden, 2014) in shades of grey and black and white
KM_C01_05_DEPTH_BW.png	Output (.png) for KM cores 1 to 5 displayed against depth (Blundell and Holden, 2014) in shades of grey and black and white
KM_C01_05_DEPTH_UNREC.eps	Output (.eps) for KM cores 1 to 5 displayed against depth (Blundell and Holden, 2014) with examples of unrecovered sections near surface
KM_C01_05_DEPTH_UNREC.png	Output (.png) for KM cores 1 to 5 displayed against depth (Blundell and Holden, 2014) with examples of unrecovered sections near surface
FICTITIOUS_ALT_A.eps	Output (.eps) for ficticious example data displayed against altitude
FICTITIOUS_ALT_A.png	Output (.png) for ficticious example data displayed against altitude
FICTITIOUS_ALT_B.eps	Output (.eps) for ficticious example data displayed against altitude showing range of display features
FICTITIOUS_ALT_B.png	Output (.png) for ficticious example data displayed against altitude showing range of display features

Other files	DESCRIPTION
requirements.txt	File containing details of dependencies used in initial setup of virtual environment

2.1 The python module files

When downloaded from Zenodo there are four python module program files (Table 2.1). **PPSP_strat.py** module is the main program file and is the one that is run by the user to produce a stratigraphy figure. The remaining modules (**PPSP_build.py**, **PPSP_colours.py** and **PPSP_options.py**) are used in partnership with the main **PPSP_strat.py** module to correctly

scale, build and decorate the figure as required. Unless the user is interested in the actual code the author recommends these files **are left unaltered**.

2.2 The csv files

2.2.1 Parameter file

This file contains all the parameters that a user can edit to alter the appearance of the figure. This is where the user will return after each iteration of running the program to fine tune their output. When the program is first downloaded there are seven parameter files included that can be used to create seven different figures in tandem with the corresponding data files (Table 2.1). All provided parameter files are setup to display the figures on a 27-inch (685.8 mm) screen. Screens smaller than this will display these figures but will require adjustment of the parameters governing figure dimension size to fit correctly. Any of these parameter files can used as a new starting parameter file for a user's new site by simply editing the present entries. This is the simplest way to create a new parameter file for a new set of cores. The new file can be renamed but spaces must not be used: use underscores if spaces are required in a filename and the file **must** be saved as a **comma separated csv file**.

2.2.2 Data file

This file contains all the field data for Troels Smith, charcoal and geology/basal sediment data. When first downloaded there are seven data files included that can be used to create seven different figures in tandem with the corresponding parameter files (Table 2.1). All the resultant stratigraphy figures that these seven paired sets produce are evident in section 7 and will be revisited as the construction process is described. The output from the FICTITIOUS_ALT_A.csv data using the supplied parameter file is shown in figure 2.1. The user can edit any of these six initial data files to contain their own data. The file, as with the parameter file, can be named (as before, do not use spaces, use underscores) but **must** be saved as **a csv (comma delimited) file**. After initial program setup therefore, the user can create seven different stratigraphy figures immediately and can 'experiment' with the entries in the parameter files to see how they alter the figures produced. Details of how to configure parameter and data files are available in section 4 and 5.

2.3 The output files

Output files/file are/is produced when the program has run successfully. By default, *.eps file is generated. The *.eps file can be opened in **Inkscape** or **GIMP** or similar and further edited or saved to whatever format required if eps, png or jpg is not sufficient. If working on a large monitor with good resolution a simple screenshot will often provide an excellent image. The author screenshots the output, pastes it into Inkscape and then saves as a svg file. All output figures using the data and parameters supplied in the initial download are displayed in section 7 and 8. By running any of the pairs of parameter/data files the user should see a figure that resembles one of those in section 7 and 8.

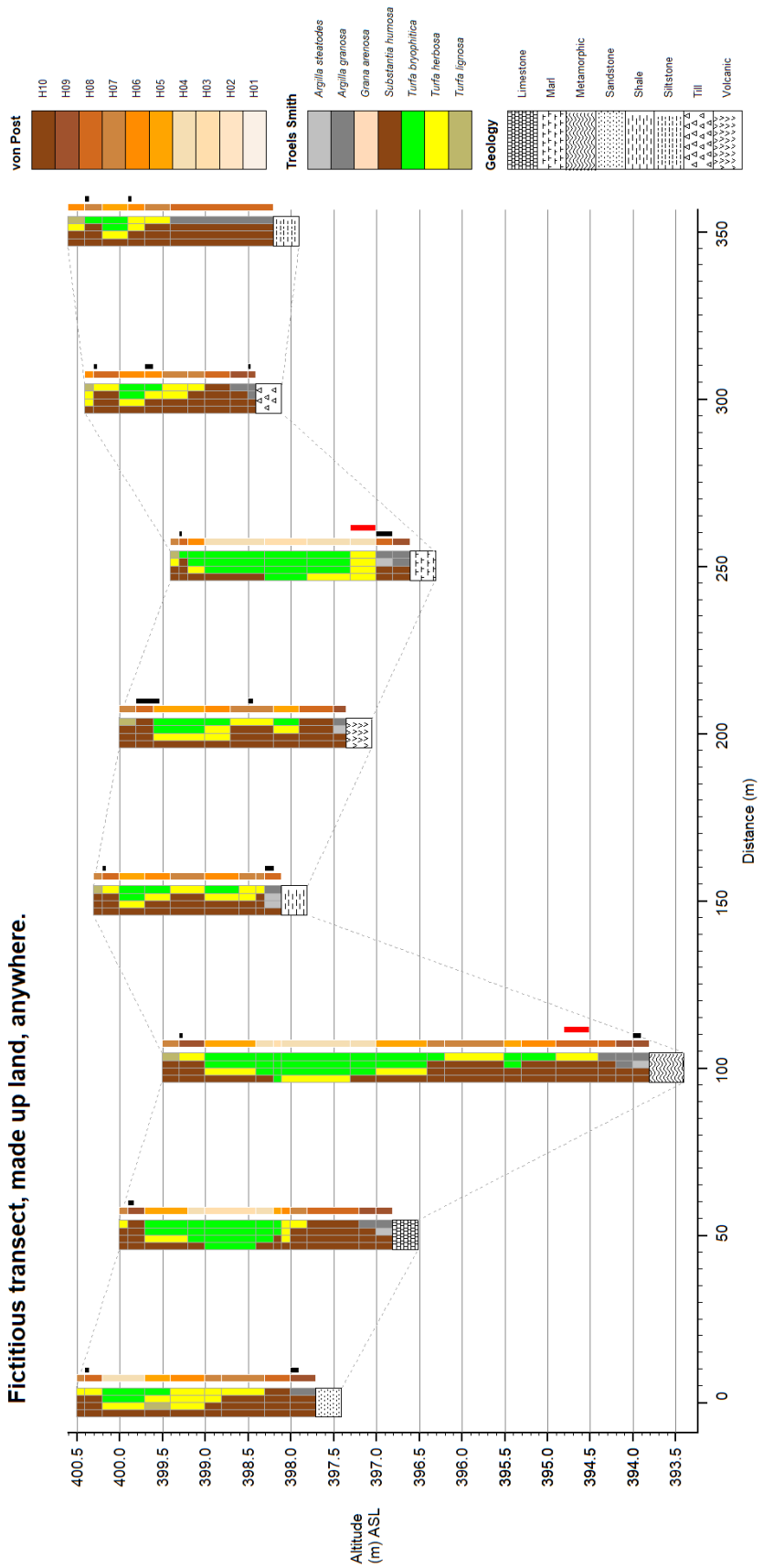


Figure 2.1. Output based on running provided FICTITIOUS_ALT_A.csv (data) and FICTITIOUS_ALT_PARA_A.csv (parameter) files.

3. Program setup and statements

3.1 Installing Python

The program is run from a 'MS Windows' command terminal (or Linux/ Mac OS equivalent) and is a simple operation once configured. This requires minimal time and can be a one-off operation. Connection to the internet is required for initial setup. Adjustments due to Linux or Mac OS usage are specified here when required. The setup procedure and program have been tested on all platforms. The author primarily uses Windows 10 or 11.

To run via the 'Windows' command terminal, assuming the user has not used python before, the user should first **install Python 3.13.7** via Download Python | Python.org (search for version 3.13.7). Upon downloading make sure '**add Python to PATH box'** is checked when installing. The PATH can be added manually later if need be and guides of how to do that are available on-line. PPSP may run on later versions but may encounter issues. The author has run it on Python versions from 3.8.1 up to 3.13.7.

3.2 Setting up a virtual environment

After installing the desired Python version, open a windows terminal by typing **cmd** into your search window (or open the terminal app in Linux/Mac OS). There are various ways the program could be deployed but here the author suggests setting up a '**virtual environment'** is most convenient, and this is where dependencies the PPSP program uses will be isolated from other work. First the user should install **virtualenv** which will help in creating a virtual environment. To do so in the cmd window (terminal) type the following command.

```
pip3 install virtualenv
```

Dependencies are mainstay programs that Python programmers use. The user should navigate to where they would like the 'virtual environment' to exist by using the **cd** (change directory) command. Here the author uses a folder named PPSP on the g: drive (a USB stick drive). The following instructions will describe steps as though the virtual environment was to be set up on this USB stick drive, but it could be any location. Having navigated to the desired folder, the user can create a virtual environment using the following command.

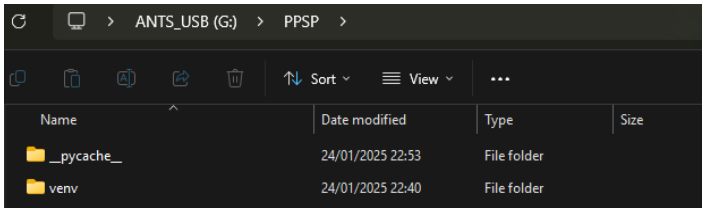
```
virtualenv -p 3.13.7 venv
```

This will only work if the version of Python stated in the command has been previously downloaded on to the user's machine. Otherwise, it will use whatever Python version is installed. Be aware of the spaces in this statement highlighted with the arrows.

The user can substitute the '**venv**' for whatever name they want to call the environment. As this is being carried out in the PPSP folder on a USB stick drive it can simply be left as venv. Creating the virtual environment will take a few minutes. To check the environment has been created successfully the user can use windows explorer or Linux/Mac OS equivalent to

look in the folder. Here, in this case in the PPSP folder, the new environment should be evident (Figure 3.1a). If the user enters the folder, they should observe content including directories called, 'Include', 'Lib' and 'Scripts' (Figure 3.1b).

a)



b)

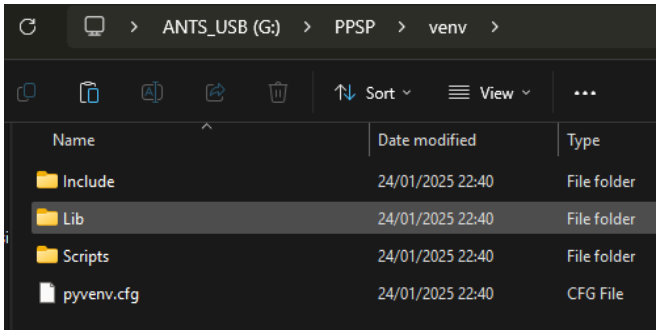


Figure 3.1. Evidence a) that virtual environment has been created and b) what is inside.

Once the virtual environment has been created, the required dependencies can now be installed. The best way to achieve this is using the **requirements.txt** file provided in the PPSP download. First activate the newly created virtual environment in the **cmd** window (or Linux/Mac OS terminal) using the following command.

venv\Scripts\activate.bat (for Windows)

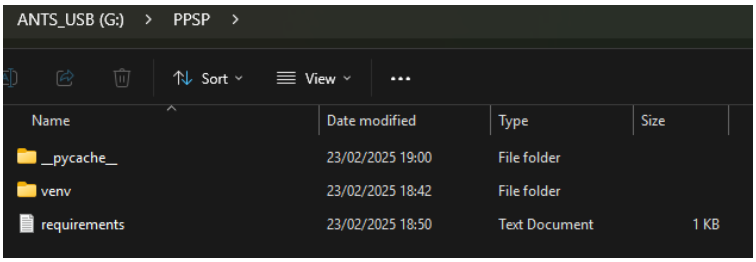
source venv/bin/activate (for MAC and Linux)

echo $VIRTUAL_ENV (to show which venv is activated (Mac / Linux))

Place a copy of the **requirements.txt** file in the folder where the new virtual environment is located (Figure 3.2a). With the environment activated, in the cmd window (or Linux/Mac OS terminal), now use the following command to download all the dependencies the program uses (Figure 3.2b).

pip3 install -r requirements.txt

a)



b)

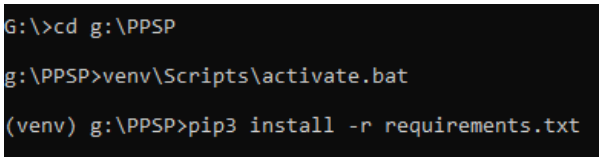


Figure 3.2. a) Requirements.txt file in place and b) the command in cmd window to obtain dependencies.

All dependencies should be downloaded after a few minutes. Dependencies and their required version numbers are **pandas==2.3.1, numpy==2.3.3** and **pillow==10.4.0**.

Dependencies can be added separately using the pip3 command, but this is **unnecessary** if the **requirements.txt** file is used. Check dependencies are present via windows explorer or Linux/Mac OS equivalent by navigating to the site packages folder and observe if folders, including those for the dependencies listed above, exist (Figure 3.3).

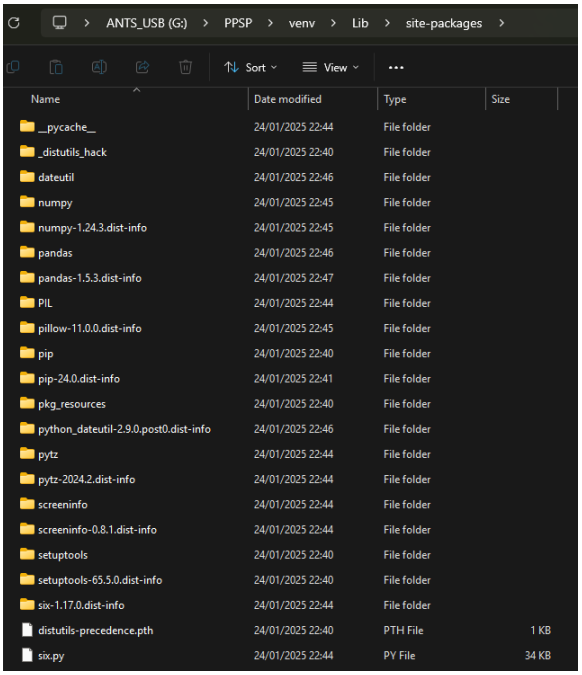


Figure 3.3. Evidence that the dependencies have been successfully loaded.

3.3 Adding files to virtual environment

The user can now proceed to add the four .py modules (**PPSP_strat.py**, **PPSP_build.py**, **PPSP_colours.py** and **PPSP_options.py**) into the folder where the new environment is located (Figure 3.4). The parameter and data files the user wish to use should be placed in this folder as well. The data file be located anywhere as the address for it is provided by the

user in the parameter file. However, it makes sense to put all these files in the same location. While the virtual environment is activated the user can also check that the right version of python has been installed by typing the following command in the cmd (terminal) window (please note the single space and two hyphens).

python --version

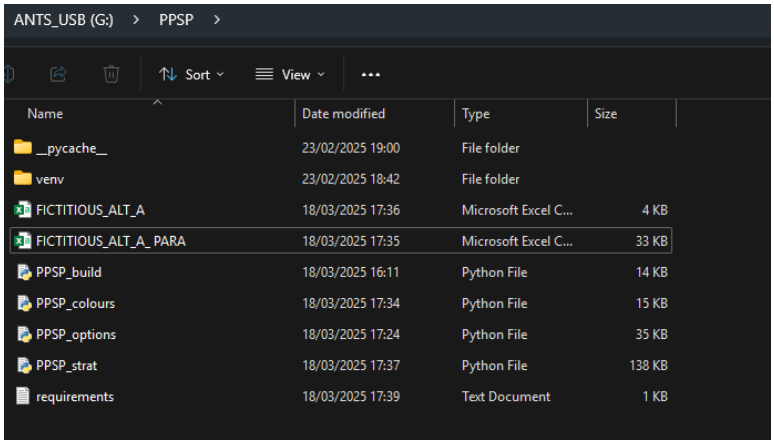


Figure 3.4. Four .py modules and the parameter and data file pair for FICTITIOUS_ALT_A added to new environment location.

3.4 Obtaining Ghostscript

The program by default produces a postscript .eps format file of the stratigraphy figure. For this to happen the user must have a copy of Ghostscript on their computer. This may already exist, but if not, it can be obtained from https://ghostscript.com/releases/gsdnld.html. After downloading the user will need to add the address for the location of the gswin64c (or version used depending on operating system) binary file into the code in the PPSP_strat.py module. For example, on the authors computer the file is located at

C:\Program Files\gs\gs10.05.0\bin\gswin64c.

So, in the PPSP_strat.py module about 50 lines up from the bottom of the code the user needs to add this address to the text. This is a **one-off** operation for the computer being used. The address can be copied and pasted here between the two " " marks (blue shaded area in Figure 3.5). The PPSP_strat.py module can be edited in notepad or an IDE. Do not change the name of the module. Save the module after it has been edited.

```
EpsImagePlugin.gs_windows_binary =  r"C:\Program Files\gs\gs10.05.0\bin\gswin64c"
ts = dave.getscreen().getcanvas()
ts = dave.getscreen().getcanvas()
ts.postscript(file= f"{output}.eps")
```

Figure 3.5. Location on line 3108 in PPSP_strat.py to add in the address of the Ghostscript binary file.

3.5 Running the program

Once the virtual environment is activated and the files are in place, to run the program the following is typed.

Note the single spaces indicated by the arrows. Once this has been typed it does not need to be typed again in a session as the up and down cursor keys allow scrolling through previous commands. For the users own data the data file and parameter file must be edited (Sections 4 and 5).

4. The Data file

The data file (e.g. **FICTITIOUS_ALT_A.csv)** is where the user inputs stratigraphy data recorded in the field. As a bare minimum Troels Smith data is required. This file can also contain data related to 1) geology/basal sediment, 2) evidence of charcoal and 3) a further 'other' category. The latter can be anything the user wishes to display by way of presence/absence. More 'other' categories could be added by the author, but these would be limited to the space on the figure. At present there is a single 'other' category that the user can employ for anything on a presence/absence basis in the same way charcoal is displayed. The FICTITIOUS data example uses it to show presence of *Phragmites*, and the other supplied examples use it to show evidence of Birch or Alder wood remains (Table 2.1; Section 7).

4.1 The structure of the data file

Entries in the FICTITIOUS_ALT_A.csv file are displayed in figure 4.1. Column headings in row 1 (red rectangle) **must not** be altered. The user supplies data in the rows below these column headings. Column headings are explained, and instruction given below as to how to fill the sheet with data. There are four groups of columns in the file the user needs to edit.

Group 1

Contains columns related to Troels Smith, geology/basal sediment and von Post data including **Altitude_m, Core_number, Location_m, TS_geology_basal, TS_description** and **von_Post**.

Group 2

Contains columns related to charcoal including **Altitude_m_charcoal**, **Core_number_charcoal, Charcoal.**

Group 3

Contains columns related to the 'other' category including **Altitude_m_other**, **Core_number_other**, and **other**.

Group 4

Contains columns related to the 'Core label' category including **Core Label and Core_number_label.**

4.1.1 Group 1

PPSP is designed to plot stratigraphy data on the y axis based on altitude (although depth can be used see Section 6). Therefore, the altitude of each core section, with different Troels Smith information, should be entered. The first entry from the FICTITIOUS_ALT_A.csv file for group 1 can be seen in Figure 3.3.2. The surface where the core was taken is at 400.5 m altitude and the depths of sections below this are subsequently subtracted. Here there are 9 sections with Troels Smith data from altitudes 400.5 (the surface) to 397.7 m. The first

Troels Smith entry (Sh-Sh-Sh-Sh) applies to the altitudinal range (400.5 to 400.4 m) from the adjacent altitude cell and the one directly below (See red boxes Figure 4.2). The final Troels Smith entry (Sh-Sh-Sh-Ag) for the first core applies to the altitudinal range 398 to 397.7 m (see blue boxes).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Altitude_m	Core_number	Location_m	TS_geology_basal	TS_description	von_Post		Altitude_m_charcoal	Core_number_charcoal	Charcoal		Altitude_m_other	Core_number_other	other		Core_label	Core_number_label	
2	400.5	1	0	TS	Sh-Sh-Sh-Th	7		400.5	1	0		400.5	1	0		C1	1	
3	400.4	1	0	TS	Sh-Sh-Sh-Th	8		400.4	1	1		400	2	0		C2	2	
4	400.2	1	0	TS	Sh-Th-Tb-Tb	4		400.35	1	0		399.5	3	0		C3	3	
5	399.7	1	0	TS	Sh-Tl-Th-Tb	5		398	1	1		394.8	3	2		C4	4	
6	399.4	1	0	TS	Sh-Th-Th-Th	6		397.9	1	0		394.5	3	0		C5	5	
7	399	1	0	TS	Sh-Sh-Th-Th	7		400	2	0		400.3	4	0				
8	398.8	1	0	TS	Sh-Sh-Sh-Th	7		399.9	2	1		400	5	0				
9	398.3	1	0	TS	Sh-Sh-Sh-Sh	8		399.82	2	0		399.4	6	0				
10	398	1	0	TS	Sh-Sh-Sh-Ag	9		399.5	3	0		397.3	6	2				
11	397.7	1	0	GEO_sandstone	0-0-0-0	0		399.3	3	1		397	6	0				
12	397.4	1	0		0-0-0-0	0		399.25	3	0		400.4	7	0				
13	400	2	50	TS	Sh-Sh-Sh-Th	7		394	3	1		400.6	8	0				
14	399.9	2	50	TS	Sh-Sh-Sh-Sh	9		393.9	3	0								
15	399.7	2	50	TS	Sh-Th-Tb-Tb	5		400.3	4	0								
16	399.2	2	50	TS	Sh-Tb-Tb-Tb	4		400.2	4	1								
17	399	2	50	TS	Tb-Tb-Tb-Tb	3		400.15	4	0								
18	398.4	2	50	TS	Sh-Tb-Tb-Tb	4		398.3	4	1								
19	398.2	2	50	TS	Sh-Sh-Tb-Tb	5		398.19	4	0								
20	398.1	2	50	TS	Sh-Th-Th-Th	6		400	5	0								
21	398	2	50	TS	Sh-Sh-Sh-Th	7		399.8	5	1								
22	397.8	2	50	TS	Sh-Sh-Sh-Sh	8		399.52	5	0								
23	397.2	2	50	TS	Sh-Sh-Sh-Ag	9		398.5	5	1								
24	397	2	50	TS	Sh-Sh-As-Ag	9		398.43	5	0								
25	396.8	2	50	GEO_limestone	0-0-0-0	0		399.4	6	0								
26	396.5	2	50		0-0-0-0	0		399.3	6	1								
27	399.5	3	100	TS	Sh-Sh-Sh-Tl	7		399.26	6	0								
28	399.3	3	100	TS	Sh-Sh-Sh-Th	9		397	6	1								
29	399	3	100	TS	Sh-Th-Tb-Tb	5		396.8	6	0								
30	398.4	3	100	TS	Sh-Tb-Tb-Tb	4		400.4	7	0								
31	398.2	3	100	TS	Tb-Tb-Tb-Tb	3		400.3	7	1								
32	398.1	3	100	TS	Th-Tb-Tb-Tb	4		400.25	7	0								
33	397.3	3	100	TS	Sh-Tb-Tb-Tb	4		399.7	7	1								
34	397	3	100	TS	Sh-Th-Tb-Tb	5		399.6	7	0								
35	396.4	3	100	TS	Sh-Sh-Sh-Tb	7		398.5	7	1								
36	396.2	3	100	TS	Sh-Sh-Sh-Th	7		398.46	7	0								

Figure 4.1 Entries in the supplied FICTITIOUS_ALT_A.csv. Entries continue beyond the view here. Core labels although entered here are not activated in the parameter file and so are not displayed in the figure produced.

The last altitude (397.4 m) for the first core delimits a lower limit of a geology or basal sediment, in this case sandstone from 397.7 to 397.4 m. Sandstone of course would potentially stretch for many metres below but here 30 cm is used just to show the reader that this is the geology or basal sediment. Core section altitudes for all cores should be placed sequentially here in the order of the transect. In the FICTITIOUS_ALT_A.csv file there are 8 different cores in the transect (Figure 4.1).

	A	B	C	D	E	F
1	Altitude_m	Core_number	x_location_m	TS_geology_basal	TS_description	von_Post
2	400.5	1	0	TS	Sh-Sh-Sh-Th	7
3	400.4	1	0	TS	Sh-Sh-Sh-Th	8
4	400.2	1	0	TS	Sh-Th-Tb-Tb	4
5	399.7	1	0	TS	Sh-Tl-Th-Tb	5
6	399.4	1	0	TS	Sh-Th-Th-Th	6
7	399	1	0	TS	Sh-Sh-Th-Th	7
8	398.8	1	0	TS	Sh-Sh-Sh-Th	7
9	398.3	1	0	TS	Sh-Sh-Sh-Sh	8
10	398	1	0	TS	Sh-Sh-Sh-Ag	9
11	397.7	1	0	GEO_sandstone	0-0-0-0	0
12	397.4	1	0		0-0-0-0	0

Figure 4.2. The entries for Troels Smith and geology/basal sediment for core 1 from the Example_data.csv file.

Core_number

Cores must be numbered from 1 onwards in this column. Each section for the first core has an entry of 1 and the second core an entry of 2 and so on (Figure 4.1).

Location_m

The user must provide an entry for distance between cores here. The first core is usually given a value of zero (0 metres). The rest are relative to the first core. In the FICTITIOUS_ALT.csv file (Figure 4.1) each core is 50 m apart. The first core sections all have an entry of zero, the second core sections an entry of 50, the third an entry of 100 and so on until the 8th core with value of 350 (Figure 4.1). However, if the user wishes to display a transect starting at values other than 0 m that is possible. Use the distances required in the Location_m column and alter the x axis parameters as appropriate (x_maj_ticks** especially). This will be revisited in section 5.

TS_geology_basal

The user must provide an entry for each section of each core except for the final section. This column informs the program whether Troels Smith or geology/basal sediment data needs to be drawn. For Troels Smith an entry of '**TS**' is required. For geology/basal sediment one of the following entries (Table 4.1) is necessary dependent on the geology/basal sediment depiction required. The final entry should be left blank (Figure 4.2 see green rectangle).

Table 4.1. Geology/basal sediment terms from PPSP and the entries the user should add to display them.

Geology / basal sediment	Entry options
Coal	GEO_coal
Limestone	GEO_limestone
Marl	GEO_marl
Metamorphic	GEO_metamorphic
Mudstone	GEO_mudstone
Sandstone	GEO_sandstone
Shale	GEO_shale
Siltstone	GEO_siltstone
Till	GEO_till
Volcanic	GEO_volcanic

TS_description

The user should supply the Troels Smith description recorded in the field. The scheme employs four 25% assignments. The program uses the Troels Smith abbreviations separated by hyphens. All abbreviations and their definitions are listed in figure 1.1a. The second column of figure 1.1a lists the abbreviations and the third column the descriptions. An entry for a section of peat consisting of 100% *Substantia humosa* would be '**Sh-Sh-Sh-Sh'**. An entry for 50% *Turfa bryophitica*, 25% *Turfa lignosa* and 25% *Turfa herbosa* would be as follows '**Tb-Tb-Tl-Th'**. The case of the letters is important and **should** be adhered to. The program will still run if 'th' is used as opposed to 'Th' for example but to keep records correctly the user should keep to the correct cases.

The order that the Troels Smith data is plotted in an individual core section is completely dependent on the order used when the data is entered. For example, a section of 50% Tb and 50% Th could look like the two examples below (Figure 4.3) based on providing the entries underneath them. It is best to be consistent in the order used through each section in all cores to provide clarity.

Th-Th-Tb-Tb **Tb-Tb-Th-Th**

Figure 4.3. Possible displays of a section depending on the order of the Troels Smith assignments.

When there is no Troels Smith data (because there is a geology/basal sediment entry) an entry of '**0-0-0-0**' is required (Figure 4.4. See red rectangle). All the TS_description column should have an entry of either a Troels Smith description or '0-0-0-0' (Figure 4.1).

	A	B	C	D	E	F
1	Altitude_m	Core_number	x_location_m	TS_geology_basal	TS_description	von_Post
2	400.5	1	0	TS	Sh-Sh-Sh-Th	7
3	400.4	1	0	TS	Sh-Sh-Sh-Th	8
4	400.2	1	0	TS	Sh-Th-Tb-Tb	4
5	399.7	1	0	TS	Sh-Tl-Th-Tb	5
6	399.4	1	0	TS	Sh-Th-Th-Th	6
7	399	1	0	TS	Sh-Sh-Th-Th	7
8	398.8	1	0	TS	Sh-Sh-Sh-Th	7
9	398.3	1	0	TS	Sh-Sh-Sh-Sh	8
10	398	1	0	TS	Sh-Sh-Sh-Ag	9
11	397.7	1	0	GEO_sandstone	0-0-0-0	0
12	397.4	1	0		0-0-0-0	0

Figure 4.4. Entries for core 1 from FICTITIOUS_ALT_A.csv file. Note red rectangle where there is no Troels Smith entry because of geology/basal sediment being depicted. Therefore, in this column entries of '0-0-0-0' are required.

Unrecovered parts of stratigraphy

In the field it is possible that parts of the stratigraphy are not recorded because the peat or other material was not able to be recovered in the corer or gouge. This can be represented in later versions of PPSP from v1.0.2 onwards. The user needs to make the following adjustments to an entry. In Figure 4.5 part of the core has not been recovered. The user in this instance should add '**UR**' in the **TS_geology_basal** column and Ur-Ur-Ur-Ur into the **TS_description** column. When plotted this section will have the four sections but will display an empty space or a colour and boundary defined by the user. Options for how this space can be displayed are explained in section 5.1.7.

a)

	A	B	C	D	E
1	Altitude_m	Core_number	Location_m	TS_geology_basal	TS_description
2	399.11	1	0	TS	Sh-Th-Tb-Tb
3	399.05	1	0	TS	Tl-Tb-Tb-Tb
4	398.97	1	0	UR	Ur-Ur-Ur-Ur
5	398.54	1	0	TS	Sh-Tl-Th-Th

b)

Figure 4.5. Example entry a) to display part of the stratigraphy that has not been recovered and b) the resultant display if white is specified as the colour. The boundary lines are automatically coloured white so in this instance there is complete break where the core has not been recovered.

von_Post

If the user wishes to display von Post data, it is entered here. In a survey the von Post value would be given for each of the discernibly different sections of peat in the core corresponding to those of the Troels Smith information. Therefore, this column is allied to the Altitude_m values used by the Troels Smith data. Values on the von Post humification scale (von Post, 1922, von Post, 1924) range from 1 to 10 with 1 being completely undecomposed and 10 being completely decomposed. Values are added here as numbers 1

to 10 with one entry per section of each core. Entries are not relevant for geology or basal sediments so these entries **must be** given a **0** value (Figure 4.6, see red rectangle). If an unrecovered section is specified in the TS columns the corresponding von Post entry must be 0 if von Post is being displayed.

	A	B	C	D	E	F
1	Altitude_m	Core_number	x_location_m	TS_geology_basal	TS_description	von_Post
2	400.5	1	0	TS	Sh-Sh-Sh-Th	7
3	400.4	1	0	TS	Sh-Sh-Sh-Th	8
4	400.2	1	0	TS	Sh-Th-Tb-Tb	4
5	399.7	1	0	TS	Sh-Tl-Th-Tb	5
6	399.4	1	0	TS	Sh-Th-Th-Th	6
7	399	1	0	TS	Sh-Sh-Th-Th	7
8	398.8	1	0	TS	Sh-Sh-Sh-Th	7
9	398.3	1	0	TS	Sh-Sh-Sh-Sh	8
10	398	1	0	TS	Sh-Sh-Sh-Ag	9
11	397.7	1	0	GEO_sandstone	0-0-0-0	0
12	397.4	1	0		0-0-0-0	0

Figure 4.6. Entries for core 1 from FICTITIOUS_ALT_A.csv file. Note red rectangle where von Post data is not required as it is a level where geology/basal sediment is being entered. Therefore, theses entries are given a value of '0'.

4.1.2 Group 2

This group of columns allows data for charcoal presence to be added to a figure. Entry differs slightly from the Troels Smith/basal sediment group.

Altitude_m_charcoal

Here the user **must** supply the surface altitude of each core followed by the range of depths that charcoal is evident. If no charcoal was observed every core must have an entry of at least the surface altitude. The example below (Figure 4.7) shows a surface altitude for each core but no charcoal presence. This is the minimum that **must** be supplied.

H	I	J
Altitude_m_charcoal	Core_number_charcoal	Charcoal
400.5	1	0
400	2	0
399.5	3	0
400.3	4	0
400	5	0
399.4	6	0
400.4	7	0
400.6	8	0

Figure 4.7. Example of minimum entry requirement in charcoal related columns for FICTITIOUS_ALT.csv if each core had no charcoal.

If charcoal is present (as is the case in FICTITIOUS_ALT_A.csv) this can now be expanded to include those data. Below are the entries for the eight cores in the FICTITIOUS_ALT_A.csv file (Figure 4.7). The first two cores are fully annotated with surface entries (red rectangles) and entries for charcoal bands (green rectangles). After core number 2 just the surface altitudes are annotated with text as the procedure should be clear. An entry of **1** is required if there is charcoal present. The value below this is an effectively useless cell so a **0** should be added.

Core_number_charcoal

As can be seen in figure 4.8 the core number should be supplied in this column. There should be no empty cells.

Charcoal

An entry of **1** is required to record the presence of charcoal between the depths supplied. The entry directly below should always be zero (Figure 4.8).

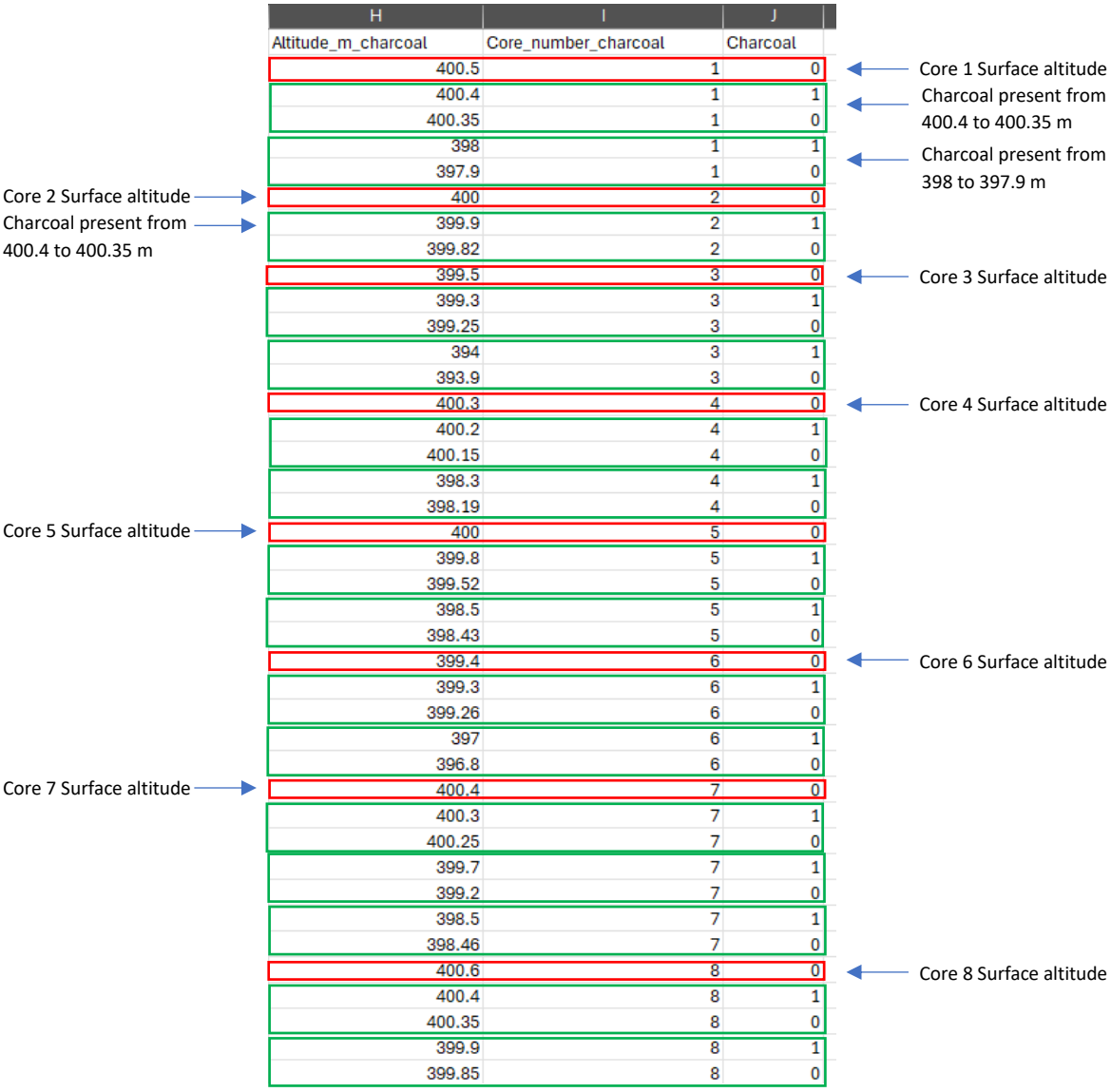


Figure 4.8. Entries and annotations explaining entries for the charcoal data from the FICTITIOUS_ALT_A.csv file. Red rectangles highlight the surface altitude and associated entries for each core and the green rectangles the subsequent charcoal layer entries.

4.1.3 Group 3

This group allows for a 'other' category to be depicted on the figure in the same way as group 2 for charcoal. Here in FICTITIOUS_ALT_A.csv the author has used it to highlight evidence of where *Phragmites* was found. This could however be used for any presence/absence data.

Altitude_m_other

Here the user for each core **must** supply the surface altitude of each core followed by the range of depths that 'other' is evident. If no 'other' was observed every core must have an entry of at least the surface altitude. See the example in Figure 4.8 for charcoal. This is the minimum that **must** be supplied.

Core_number_other

As can be seen in Figure 4.9, in the same way as for the charcoal example, the core number should be supplied in this column. There should be no empty cells.

Other

An entry of '**2'** is required to record the presence of **other** between the depths supplied. The entry directly below should always be zero. The value here **must be 2** not 1 as for charcoal (Figure 4.9).

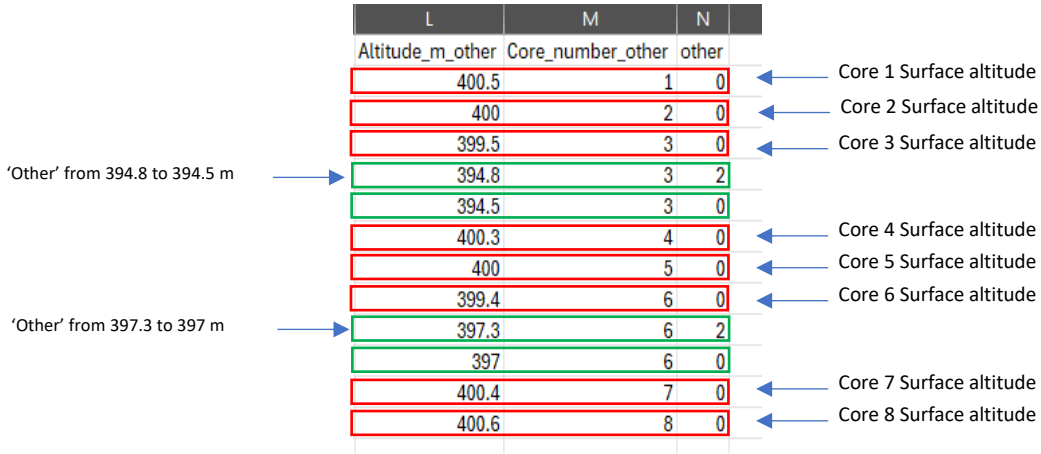


Figure 4.9. Entries and annotations explaining entries for the 'other' data from the FICTITIOUS_ALT_A.csv file. Red rectangles highlight the surface altitude and associated entries for each core and the green rectangles the subsequent 'other' layer entries.

4.1.3 Group 4

Entries are provided here if required for core labels that will be displayed above the surface of each core. The number of entries should equal the number of cores being plotted. The text to be used is provided in the **Core_label** column and the core number they refer to in the **Core_number_label** column. The appearance of the text is controlled via entries in the parameter file.

P	Q
Core_label	Core_number_label
A1	1
A2	2
A3	3
A4	4
A5	5
A6	6
A7	7
A8	8

Figure 4.10. Example of entries for text to be used as labels above each core in the Core_label column and the core number it refers to in the Core_number_label column.

5. The parameter file

This file is where all the user defined parameter choices are made to define how the figure output will appear and can be renamed if it is saved as a comma delimited csv file with no spaces in the name.

5.1 The structure of the parameter file

There are **15 groups** of parameters that can have user inputs. These are listed below and the type of inputs explained. The groups are listed in column A of the csv file and the headings **must not** be altered. The user must only alter entries in column B. Column C contains notes pertaining to the parameter and the acceptable inputs.

To repeat the user should only edit column B and not any of the headings in row A or the text in Columns A and C.

The program will potentially fail to run if these areas are edited. If this occurs, then it is wise to have an unaltered copy stored that can be used and re-edited.

Listed below are headings that describe the type of individual parameters that can be edited by the user within their group. Individual parameters within these groups followed by ** are marked as such because they **must** have an entry for the program to run successfully. Remaining parameters are optional based on what the user has selected. The program has a substantial number of error checking procedures and associated error messages. These are designed to provide useful feedback on errors and how to rectify them. These will occur as the program is run. The program will run, possibly detect an error, and if so, will then stop and give the user a reason why it stopped. Once the user has acted upon this error message the program can be re-run. Error messages will appear in the cmd window (terminal) if that is how the program is being run or in the kernel window of an IDE.

Group headings in the parameter file

1) FILES AND DIRECTORY
2) CANVAS
3) MAIN TITLE
4) X AXIS
5) Y AXIS
6) CORE JOINING LINE
7) TROELS SMITH
8) TROELS SMITH LEGEND
9) VON POST
10) VON POST LEGEND
11) GEOLOGY/BASAL SEDIMENT
12) GEOLOGY/BASAL SEDIMENT LEGEND
13) CHARCOAL
14) OTHER
15) CORE LABELS

5.1.1 FILES AND DIRECTORY

All the parameters in this group must contain an entry and hence all headings are followed by **.

directory**

Here the directory where the data file is **must** be provided. The subdirectories should be separated by double backslashes \\. The example in the FICTITIOUS_ALT_A_PARA.csv file is as below. This can be the same directory as where the virtual environment is located. It is best to keep these the same.

G:\\PSPP

input_file_name**

Here the data file name should be provided. It will be a .csv file (comma separated) but the **extension is not required** so in the parameter file (FICTITIOUS_ALT_PARA.csv) the entry is.

FICTITIOUS_ALT_A

output_file_name**

The output file name can be anything the user wants. **Do not add extensions** as these will be added based on the entry to image_format** parameter. It is suggested that the file name does not contain spaces. Employ underscores for spaces. In the parameter file (FICTITIOUS_ALT_A_PARA.csv) the entry is.

FICTITIOUS_ALT_A

image_format**

Here the output format is specified. The user can specify **png** or **jpg**. The program will automatically produce an **eps** file. The latter can be opened in various programs including the open source Inkscape or GIMP package. Ghostscript will also need to be available if using Inkscape. If the user's monitor is large and of good resolution, then a simple screen shot may more than suffice.

5.1.2 CANVAS

All the parameters in this group must have an entry for the program to run and hence all headings are followed by **.

canvas_width_mm**

The canvas can be thought of as the area or window that the figure will be displayed in. The user must specify the size of the canvas width in mm. The user can measure their own monitor size and decide upon a suitable width. All parameter files supplied as part of the program download are setup so these figures will all fit easily within a 27-inch monitor. For example, the value used in FICTITIOUS_ALT_A_PARA.csv is 570 mm. **Do not** use decimal places as this is unnecessary with mm units. Entries should be integer values.

canvas_height_mm**

As for canvas width but for height in mm. For example, the value used in FICTITIOUS_ALT_A_PARA.csv is 300 mm

figure_scale_factor**

The canvas width and height govern the size of the window and drawing area, but the figure_scale_factor is used to ensure the figure will fit within that space. This is a proportion. A value of 1 would mean the figure takes up the entire space of the drawing area. More suitable is to allow a scaled reduction so the figure easily fits in the window area. Therefore, a typical value here is **0.7**. This is a sensible value to begin with.

figure_border**

This parameter allows for a border between the axes of the plot and the contents within the plot. This is given in mm and a sensible initial entry would be 5 mm. This may need to increase or decrease based on the size of monitor the user employs.

5.1.3 MAIN TITLE

Parameters related to the content and appearance of the main title.

main_title_on_off**

The user should supply the entry '**on**' or '**off**' depending on whether a main title is required or not. An entry **must** be supplied.

main_title

The user can supply a main title here. For the title to be displayed the **main_title_on_off** parameter must be 'on'.

main_title_colour

The user can specify the colour used for the main title here. The user can use any colour from the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation, Figure 5.1). **This selection of colours applies for every instance of colour parameter in the parameter file.**

Figure 5.1. List of named colors — Matplotlib 3.10.0 documentation

main_title_size

The user can supply a font size here.

main_title_style

The user can supply a text style here. Options available are '**normal**', '**bold**' or '**italic**'.

main_title_v_adjust

The main title will be placed in a default position on the figure. Here the title can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

main_title_h_adjust

The main title will be placed in a default position on the figure. Here the title can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

5.1.4 X AXIS

These parameters relate to the setup and appearance of the x axis which is typically distance between cores.

x_axis _colour**

User can specify a colour for the x axis line.

x_axis _width**

User can specify a width value for the x axis. Typical value would be between 1 and 3.

---

x_title_on_off**

The user should supply the entry '**on**' or '**off**' depending on whether an x axis title is required or not. An entry **must** be supplied.

x_title_line_1

User can supply x axis title text

x_title_line_2

User can supply x axis title text for a second line if required.

---

x_title_font_size

User can specify a font size for the x axis title. **x_axis_title_on_off**** must be 'on'.

x_title_colour

User can specify a colour for the x axis title text. **x_axis_title_on_off**** must be 'on'.

x_title_style

User can specify a style for the x axis title text. **x_axis_title_on_off**** must be 'on'. Options are '**normal**', '**bold**' or '**italic**'.

x_title_v_adjust

The x axis title will be placed in a default position on the figure. Here the title can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

x_title_h_adjust

The x axis title will be placed in a default position on the figure. Here the title can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

---

x_major_ticks**

User **must** specify the x major axis labels to be displayed based on the x axis representing distance between cores. These should be provided as a list with items separated by *. The FICTITIOUS_ALT_PARA.csv file has the following entry. Here the labels are equally spaced from 0 to 350. No spaces should exist in the entry. PPSP essentially draws these ticks and labels on to the axes based on the range of distances from all cores. Therefore, the user should note the start and the furthest distances which in the FICTITIOUS_ALT_A.csv data file is 0 and 350 m. Major ticks should be chosen within this range as listed below. If the final core was located at 352 m as opposed to 350 m the axis drawn by PPSP will end at 352. Minor ticks can be continued after the last major tick by using the **x_min_ticks_max** parameter**.**

0*50*100*150*200*250*300*350

x_major_shift**

The program by design plots the first core in a sequence at 0 m distance on the x axis and then however far away the others are from it. However, the user can specify any labels in the x_maj_ticks** parameter. However, if the first core for example is at 23 m and the first designated major tick is at 20 m the program will plot the first core at 20 m. Therefore, this shift parameter allows this to be corrected. A value of 3 here would ensure the first and all cores were shifted 3 m along the x axis (Distance m) so that they line up correctly. There must be an entry as shown by the **. If no shift is required enter a value of zero (**0**).

x_major_tick_decimal**

User **must** provide the number of decimal places to be displayed in the x major tick label.

x_major_tick_length**

User **must** supply a length for the x major ticks in mm.

x_major_tick_width**

User **must** supply a width for the x major ticks.

x_major_tick_colour**

User **must** supply a colour for the tick marks (applied to major and if specified the minor ticks).

---

x_minor_ticks_on_off**

User **must** specify if the figure should have x axis minor tick marks. User should use '**on**' or '**off**'.

x_minor_tick_length

User can supply a length for the x minor ticks in mm assuming **x_min_ticks_on_off**** is on.

x_minor_tick_width

User can supply a width for the x minor ticks.

x_minor_tick_colour

User can supply a colour for x minor tick marks. **x_min_ticks_on_off**** must be on.

x_minor_ticks_max

User can supply the maximum value to which minor ticks will continue. This is used to ensure minor ticks exist all the way to the top of the axis even if the axis does not end on a major tick.

x_minor_ticks_step

User can supply the step between each minor tick.

---

x_label_font_size**

User **must** supply a font size for the x tick labels.

x_label_colour**

User **must** supply a colour for the x tick labels.

x_label_style**

User **must** supply a style for the x tick labels.

x_label_v_adjust**

The x axis major tick labels will be placed in a default position close to the associated ticks on the figure. Here they can be adjusted vertically if required. Adjustments are in mm. An entry **must** be provided. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

x_tick_label_h_adjust**

The x axis major tick labels will be placed in a default position close to the associated ticks on the figure. Here they can be adjusted horizontally if required. Adjustments are in mm. An entry **must** be provided. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

5.1.5 Y AXIS

y_axis _colour**

User can specify a colour for the y axis line.

x_axis _width**

User can specify a width value for the y axis. Typical value would be between 1 and 3.

---

y_axis_title_on_off**

The user should supply the entry '**on**' or '**off**' depending on whether an y axis title is required or not. An entry **must** be supplied.

y_axis_title_line_1

User can supply y axis title text

y_axis_title_line_2

User can supply y axis title text for a second line if required.

---

y_title_font_size

User can specify a font size for the x axis title. **y_axis_title_on_off**** must be 'on'.

y_title_style

User can specify a style for the x axis title text. **y_axis_title_on_off**** must be 'on'. Options are '**normal**', '**bold**' or '**italic**'.

y_title_colour

User can specify a colour for the x axis title text. **y_axis_title_on_off**** must be 'on'.

y_title_v_adjust

The x axis title will be placed in a default position on the figure. Here the title can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

y_title_h_adjust

The x axis title will be placed in a default position on the figure. Here the title can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

---

y_maj_ticks**

User **must** specify the y major axis labels to be displayed based on the range of core and section altitudes. These altitudes (see Section 6 about using depth) should be provided as a list separated by *. An example entry from the FICTITIOUS_ALT_A_PARA.csv file is listed below. Here the labels are equally spaced from 400.5 to 393.5. There should be no spaces in the entry. PPSP essentially draws these ticks and labels on to the axes based on the range of altitudes from all cores. Therefore, the user should note the highest and the lowest altitudes which in FICTITIOUS_ALT.csv data file is 400.6 and 393.4 m. highest and lowest value major ticks should be chosen within this range as listed below. Here 0.5 m interval is used and the upper (400.5) and lower (393.5) values are within the range of altitudes shown by the cores. The program will add minor ticks if requested for values below the lowest major tick provided by the user but for minor ticks to be shown above the uppermost major tick the **y_min_ticks_max** parameter should be edited.

400.5*400*399.5*399*398.5*398*397.5*397*396.5*396*395.5*395*394.5*394*395.5*395*394.5*394*393.5

y_maj_ticks_depth_mode**

To allow the plot to use depth as opposed to altitude the user must enter **'on'** here. Possible entries are **'on'** or **'off'**. This makes sure that the negative entries supplied by the user are displayed as positive values. See section 6 for details of how to plot cores vs depth as opposed to altitude. An entry **must** be supplied as denoted by the **.

y_maj_tick_decimal**

User **must** provide the number of decimal places to be displayed for the y major tick label.

y_major_tick_length**

User **must** supply a length for the y major ticks in mm.

y_major_tick_width**

User **must** supply a width for the y major ticks.

y_major_tick_colour**

User **must** supply a colour for the tick marks (applied to major and if specified the minor ticks).

---

y_label_font_size**

User **must** supply a font size for the y tick labels.

y**_label_colour****

User **must** supply a colour for the tick labels. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

y_label_style**

User **must** supply a style for the x tick labels.

y_tick_label_v_adjust**

The y axis major tick labels will be placed in a default position close to the associated ticks on the figure. Here they can be adjusted vertically if required. Adjustments are in mm. An entry **must** be provided. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

y_tick_label_h_adjust**

The y axis major tick labels will be placed in a default position close to the associated ticks on the figure. Here they can be adjusted horizontally if required. Adjustments are in mm. An entry **must** be provided. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

---

y_minor_ticks_on_off**

User **must** specify if the figure should have Y axis minor tick marks. User should use '**on**' or '**off**'.

y_minor_tick_length

User can supply a length for the y minor ticks in mm assuming y_minor_ticks_on_off** is on.

y_minor_tick_width

User can supply a width for the y minor ticks assuming y_minor_ticks_on_off** is on.

y_minor_tick_colour

User can supply a colour for x minor tick marks. **y_minor_ticks_on_off**** must be on.

y_minor_ticks_max

User can supply the maximum value to which minor ticks will continue. This is used to ensure minor ticks exist all the way to the top of the axis even if the axis does not end on a major tick.

y_minor_ticks_step

User can supply the step between each minor tick.

---

y_grid_on_off**

User **must** specify if y axis grid lines are required. User should enter '**on**' or '**off**'.

y_grid_style

User can provide grid line style. Options are '**solid**' or '**dashed**'. Dash length can be specified below (using y_grid_dash_length) thus allowing a dotted pattern also. y_grid_on_off** must be on.

y_grid_colour

User can supply a colour for the y grid lines. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation**)**. y_grid_on_off** must be on.

y_grid_width

User can supply a width for the y grid lines. y_grid_on_off** must be on.

y_grid_length_adjust

User can adjust the length of the entire grid line. Values are in mm. Zero (**0**) if no adjustment is required. Positive values extend the line to the right, negative values shrink the line to the left.

y_grid_dash_length

User can supply a length for the y grid line dashes in mm. y_grid_on_off** must be on and y_grid_style must be dashed.

5.1.6 CORE JOINING LINE PARAMETERS

Here the user can provide entries for parameters related to displaying join lines between cores.

surface_join_line_on_off**

User **must** specify if the surface join line is required. User should supply '**on**' or '**off**'. This line simply joins the surface of each core from one to the adjacent one.

surface_join_line_colour

User can specify the colour of the surface join line.

surface_join_line_width

User can specify the width of the surface join line. Typical entry would be between 1 and 3.

surface join_line_style

The user can supply a surface join line style. Options are '**solid**' or '**dashed**'. Dash length can be specified below (using surface_join_line_dash_length) thus allowing a dotted pattern also. surface_join_line_on_off** must be 'on'.

surface_join_line_dash_length

User can supply a length for the join line dashes in mm. surface_join_line_on_off** must be on and surface_join_line_style must be dashed.

---

base_join_line_on_off**

User must specify if the basal join line is required. User should supply '**on**' or '**off**'. This line simply joins the base of each core from one to the adjacent one.

base_join_line_colour

User can specify the colour of the surface join line.

base_join_line_width

User can specify the width of the surface join line. Typical entry would be between 1 and 3.

base join_line_style

The user can supply a base join line style. Options are '**solid**' or '**dashed**'. Dash length can be specified below (using base_join_line_dash_length) thus allowing a dotted pattern also. base_join_line_on_off** must be 'on'.

base_join_line_dash_length

User can supply a length for the join line dashes in mm. base_join_line_on_off** must be on and base_join_line_style must be dashed.

5.1.7 TROELS SMITH PARAMATERS

Here the user can provide entries for parameters related to displaying the Troels Smith data.

ts_width_section**

User **must** provide a value here. This is the width of each individual rectangle that makes up the Troels smith display (See blue arrow in figure 5.2). Values are in mm. A sensible starting number would be between 2 to 4.

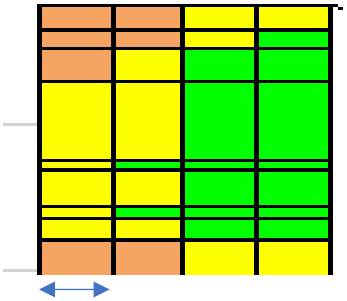


Figure 5.2. Width of rectangles (blue arrow) used is given in the ts_width_section parameter in mm.**

line_colour**

The user **must** select a colour for the lines between the Troels Smith displays. In figure 5.3 are the results of the entry being black (a 'likely' choice), blue, red (less

likely choices) and white. White has the effect of appearing as though there are no lines.

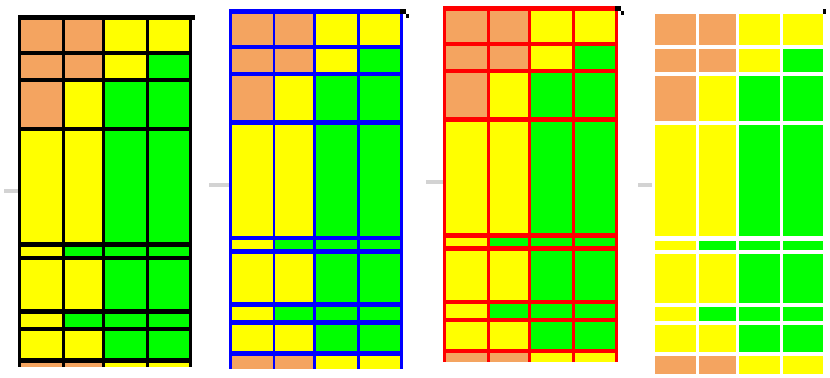


Figure 5.3. Different line_colour entries of black, blue, red and white displayed.**

unrecovered_line_on_off**

The user must provide an entry of either '**on**' or '**off**' here whether parts of the core are unrecovered or not (see section 4.1.1). If no sections are unrecovered leave the entry as '**off**'. If there are unrecovered sections and the user wishes to display a border line around them add the '**on**' entry (see figure 5.4).

unrecovered_line_colour**

The user must provide an entry here whether sections are unrecovered or not. Supplied example parameter files have an entry of "**black**" but any colour can be used from figure 5.1. See figure 5.4 for examples.

unrecovered_empty_fill**

The user must provide an entry here whether sections are unrecovered or not. If the user is displaying unrecovered sections but requires an empty space as opposed to white, or coloured fill specified (see nomenclature section below) then an entry of '**on**' should be added here. Options are **'on'** or **'off'**. See figure 5.4 for examples.

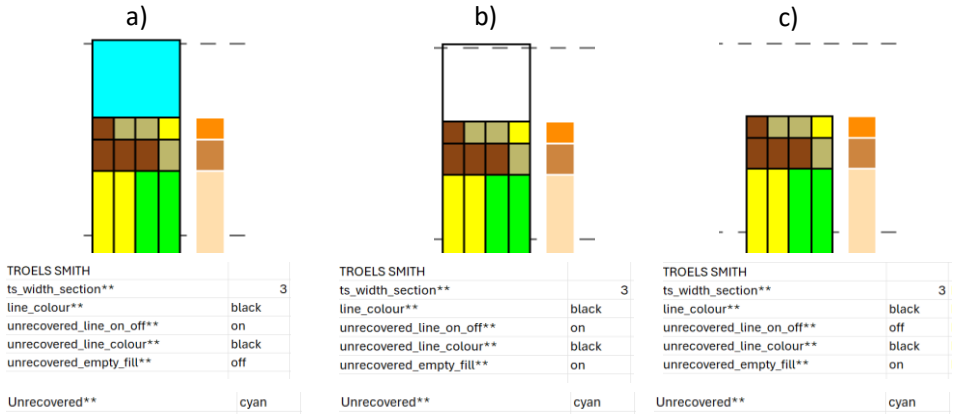


Figure 5.4. Entries in the parameter file and resultant outputs for an unrecovered section; a) coloured fill and border line, b) empty fill with border line and c) no fill or border line. The unrecovered option is listed in the nomenclature section.**

Remove segments**

Here the user can choose to avoid the four-compartment depiction in the stratigraphy core. This is for when the user has not carried out the detailed TS scheme assessment and has perhaps just called each section of the core a single term. The user may have called a single segment 'clay' or 'woody peat' or may have used a TS term and applied it to the section as a whole. In this case the user would add in the data file an entry such as As-As-As-As for clay and Tl-Tl-Tl-Tl for woody peat. Here the same TS terms that apply are used in the data file. By entering 'on' into the **Remove segments** entry in the parameter file any entry for the cores in the data file with four of the same description such as As-As-As-As will now not have these boundaries. Below is an example for three entries on a core (Figure 5.5). The first is with **Remove segments** listed as 'on' the second as 'off'. Although these use the TS entries in the data file the depiction in the figure legend can be anything if the **Use alternative TS name** option below is employed**.**

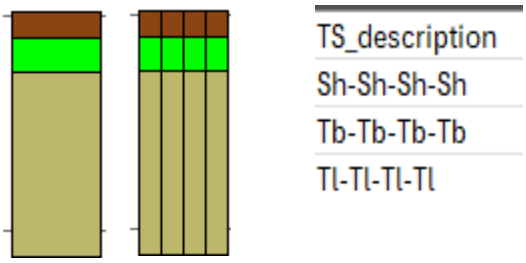


Figure 5.5. Image of core with sections of four repeated TS notations of Sh, Tb and Tl. One image shows the sections displayed with the section boundary lines removed and one with them in place.

Nomenclature

These are standard terms used in the Troels Smith scheme. There **must** be colour entries for all whether they are used in the figure or not. The user can simply give the same colour to all terms that are not used. A colour scheme has been entered by the author in all the parameter files supplied as part of the program download. This is a colour scheme the author believed was reasonable for cores from a peatland. However, these can all be altered using the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation). All the terms are followed by a double asterisk to signify an entry must be supplied. A screen shot from one of the supplied parameter files (Table 3.4.1) shows the colour choices.

Nomenclature	
Argilla steatodes**	silver
Argilla granosa**	gray
Grana arenosa**	peachpuff-n
Grana saburralia**	peru-n
Grana glareosa minora**	coral
Grana glareosa majora**	orangered
Detritus granosus**	crimson-n
Detritus herbosus**	fuchsia-n
Detritus lignosus**	darkviolet-n
Limus calcareus**	skyblue-n
Limus detrituosus**	deepskyblue-n
Limus ferrugineus**	steelblue-n
Particulae testae molloscorum**	white-n
Substantia humosa**	saddlebrown
Turfa bryophitica**	lime
Turfa herbosa**	yellow
Turfa lignosa**	darkkhaki
Unrecovered**	white

Table 5.1. Table showing the nomenclature of Troels Smith entries and the colour scheme entered by the author in one of the supplied parameter files. Note the entries with the addition of '-n' on the end which alerts the program to not include these in a legend if specified. No spaces should exist in an entry.

If a legend is specified, any entries that **are not** to be included in the legend should be followed with '**-n**' as shown in Table 5.1. Any without this addition will be plotted in the legend if the legend has been selected. The terms are defined in Table 1.1a and are listed in the parameter file, for the mineral terms, in size order from Argilla granosa** to Grana glareosa majora** and then all remaining terms are listed alphabetically.

Use alternative TS name**

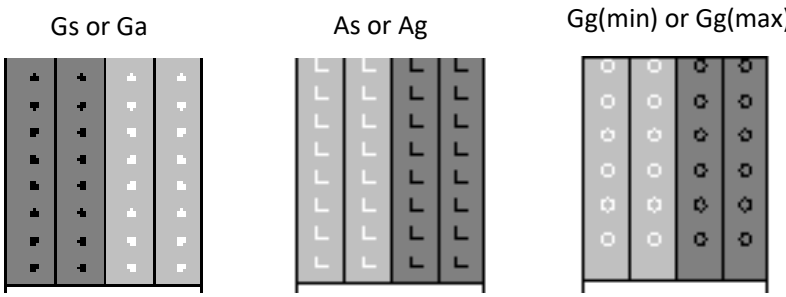
Here alternative names can be supplied if the user does not want to use the Latin names associated with Troels Smith. All entries must be filled in with an entry even if not used. The 'Use alternative TS name' entry should be 'on' if alternatives are to be used or 'off' if not. The alternative entry names should be followed by '-n' if they are not to be used. All should have an entry but if the function is on the program will look for entries without the '-n' entry.

Use Pattern

The mineral components of the Troels Smith scheme can have a patter added here. For peat there are relatively few Troels Smith categories required and therefore using colour should be sufficient including colour blind friendly schemes. However, if there are numerous mineral components the total number of colours required can make it difficult to rely on colour alone. Therefore, here the user can specify to have a pattern on top of the colour chosen to aid its depiction. The same pattern is provided for 1) Gg(max) and Gg(min), 2) Gs and Ga, 3) Ag and As. Depicting a difference between each pair can be done via a pattern and colour. For example, below are the symbols used for the three pairs that can then be

separated by colour. The symbols are related to those used in the original Troels Smith but are reduced to a single line so they can fit within each of the 4 segments.

There must be an entry for each. The entry is in two parts either ‘on’ or ‘off’ separated by an asterisk and the colour required for the symbol pattern.



Use Pattern	
Argilla steatodes tex**	on*white
Argilla granosa tex**	on*black
Grana arenosa tex**	on*white
Grana saburralia tex**	on*black
Grana glareosa minora tex**	on*white
Grana glareosa majora tex**	on*black

Figure 5.6. Example of entries from one of the parameter files provided and outputs

5.1.8 TROELS SMITH LEGEND PARAMETERS

The user can supply a series of parameters relating to the legend for the Troels Smith part of the figure.

legend_on_off**

The user **must** supply either ‘**on**’ or ‘**off**’ here.

legend_title_on_off

The user can indicate if a legend title is required. Any title will only be displayed if on the figure if legend_on_off** is ‘on’.

legend_title

The user can supply a title for the legend if required. It will only be displayed on the figure if legend_on_off** is ‘on’.

legend_title_size

The user can specify a font size for the legend title.

legend_title_style

The user can specify a style for the legend title text. Options are ‘**normal**’, ‘**bold**’ or ‘**italic**’.

legend_title_colour

User can supply a colour for the legend title text.

legend_title_v_adjust

The legend title text will be placed in a default position above the legend features on the figure. Here the position can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

legend_title_h_adjust

The legend title text will be placed in a default position above the legend features on the figure. Here the position can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

legend_x_position and **legend_y_position**

If a legend for the Troels Smith element is required, the user **must** supply the x and y positions, so the program knows where to plot the legend. **legend_x_position** and **legend_y_position** are based on distances in mm from a known point on the figure (the x/y axis intersection, point A, Figure 5.4). The entries in the FICTITIOUS_ALT_PARA.csv file have values of 430 and 85 mm. The legend has been drawn 430 mm horizontally from the x/y axis intersection (Point A). In the vertical direction the legend is drawn initially from the top of the lowest legend item box (85 mm from the top of *Turfa lignosa* in this instance, point B, Figure 5.7).

legend_font_size

The user can specify a font size for legend text.

legend_font_style

The user can specify a text style. Options are '**normal**', '**bold**' or '**italic**'.

legend_text_colour

User can supply a colour for the legend text.

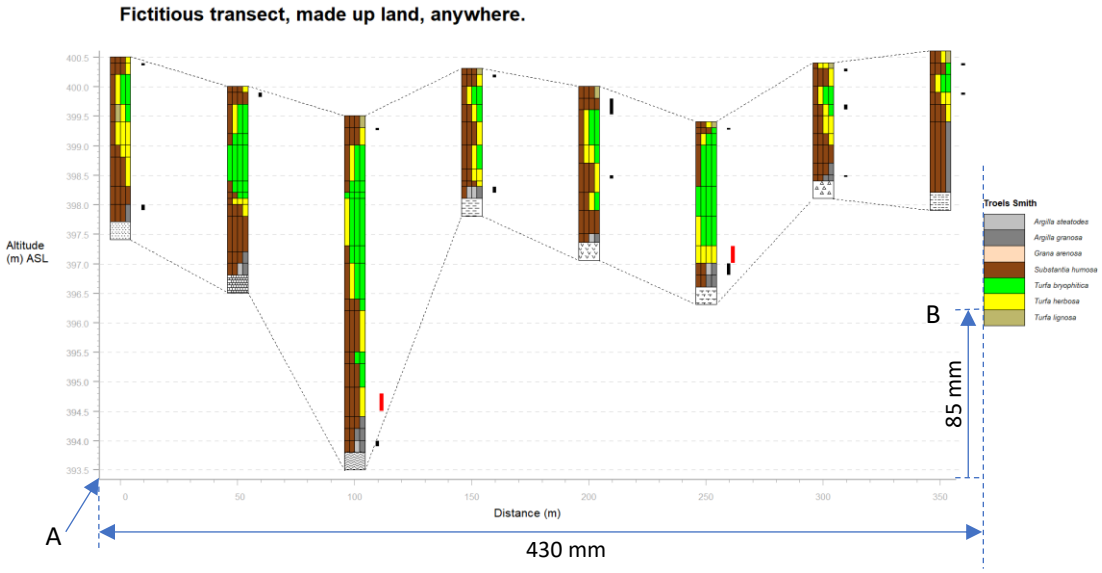


Figure 5.7. Placement of Troels Smith legend using the legend_x_position (430 mm) and legend_y_position (85 mm) parameters.

legend_section_height

User can specify the height of each legend item box in mm. See example of 10 mm (Figure 5.8).

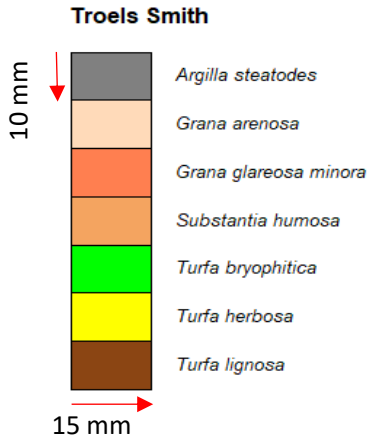


Figure 5.8. Specifying the legend section height and width.

legend_section_width

User can specify the width of each legend item box in mm. See example of 15 mm (Figure 5.8).

legend_label_v_adjust

The legend labels will be placed in a default position close to the associated legend box on the figure. Here they can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

legend_label_h_adjust

The legend labels will be placed in a default position close to the associated legend box on the figure. Here they can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

5.1.9 VON POST PARAMETERS

Here the user can provide entries for parameters related to displaying von Post data.

vp_on_off**

The user **must** supply either '**on**' or '**off**' here.

vp_border_colour

The user can select a colour for the lines between the segments. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation). This is similar to line_colour** for Troels Smith parameters.

vp_width_section

User **must** provide a value here if **vp_on_off**** is 'on'. This is the width of the column used to display (Figure 5.9) the von Post data. Values are in mm. A sensible starting number would be between 1.5 to 3.

gap_between_TS_and_vp

Here the user can specify how far away the von Post column is from the neighbouring Troels Smith core data (Figure 5.9). Values are in mm.

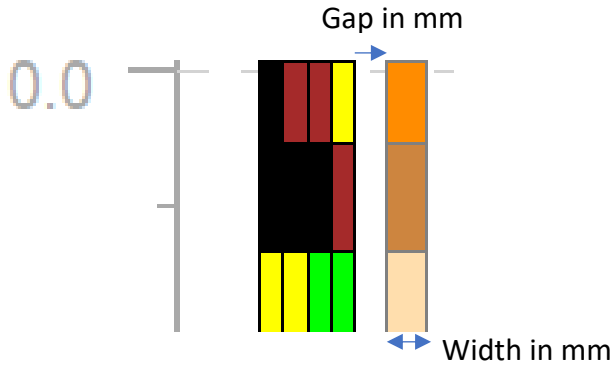


Figure 5.9. Width of von Post column and gap between the end of the Troels Smith columns and the von Post data. Values are supplied in mm.

Humification levels

The user can change the colours in the parameter file here of the ten von Post categories. The author has given a suggested colour scheme in the provided parameter files, a scheme repeated in Table 5.2. This is not definitive and should be changed to the user's specification. Users should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

Humification levels	
H1	linen
H2	bisque
H3	navajowhite
H4	wheat
H5	orange
H6	darkorange
H7	peru
H8	chocolate
H9	sienna
H10	saddlebrown
N_A	none

Table 5.2. Colour entries for von Post categories as supplied in the parameter files.

5.1.10 VON POST LEGEND PARAMETERS

Here the user can provide entries for parameters related to displaying the von Post legend.

legend_on_off_vp**

The user must supply either '**on**' or '**off**' here.

legend_title_on_off_vp

The user can indicate if a von Post legend title is required. Any title will only be displayed if on the figure if legend_on_off_vp** is also 'on'.

legend_title_vp

The user can supply a title for the von Post legend if required. It will only be displayed on the figure if legend_on_off_vp** is 'on'.

legend_title_size_vp

The user can specify a font size for the von Post legend title.

legend_title_style_vp

The user can specify a style for the von Post legend title text. Options are '**normal**', '**bold**' or '**italic**'.

legend_title_colour_vp

User can supply a colour for the von Post legend title text. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

legend_title_v_adjust_vp

The von Post legend title text will be placed in a default position above the legend features on the figure. Here the position can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

legend_title_h_adjust_vp

The von Post legend title text will be placed in a default position above the legend features on the figure. Here the position can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

legend_x_position_vp and **legend_y_position_vp**

If a legend for the von Post elements is required, the user must supply the x and y positions, so the program knows where to plot the legend. **legend_x_position_vp** and **legend_y_position_vp** are based on distances in mm from a known point on the figure (the x/y axis intersection, point A). See figure 5.4 above for Troels Smith legend.

legend_font_size_vp

The user can specify a font size for von Post legend text.

legend_font_style_vp

The user can specify a text style. Options are '**normal**', '**bold**' or '**italic**'.

legend_text_colour_vp

User can supply a colour for the von Post legend text. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

legend_section_height_vp

User can specify the height of each von Post legend item box in mm. As for Troels Smith in Figure 5.8.

legend_section_width_vp

User can specify the width of each von Post legend item box in mm. As for Troels Smith in Figure 5.8.

legend_label_v_adjust_vp

The von Post legend labels will be placed in a default position close to the associated legend box on the figure. Here they can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

legend_label_h_adjust_vp

The von Post legend labels will be placed in a default position close to the associated legend box on the figure. Here they can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

5.1.11 GEOLOGY COLOUR PARAMETERS

Here the user can provide entries for parameters related to displaying geology/basal sediment data.

border_colour_geo**

The user must select a colour for the lines between the geology displays. Figure 5.10 displays the results of black (a likely choice), blue and red (less likely choices) entries.

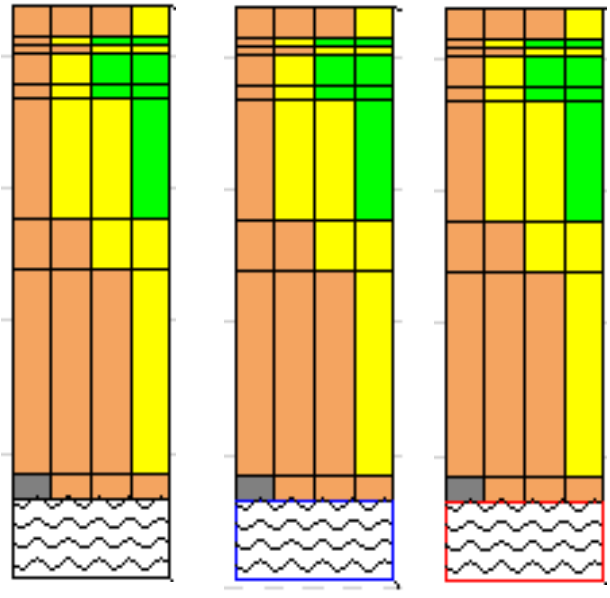


Figure 5.10. Results of geo_border_colour being black, blue or red.**

Geology or basal sediment

The user is supplied here with some general geology/basal sediment terms (Table 5.3) that have been sufficient for the author in most circumstances. The PPSP program is not an expert plotter of geological types. These are general terms simply to show the general material beneath the peat or sediment. These are listed in alphabetical order. New instances can be added if necessary. As all are followed by a ** all must have an entry whether they are used or not. The user can simply leave the entries supplied when the program was downloaded and edit the colours for the geology they wish to utilise.

Entries consist of three or possibly four parts. The first part is the foreground colour and the second the background colour. The third part is the name of the geology or basal sediment the user would like displayed in the legend, assuming the geology legend is 'on'. These first three elements must be separated by an * with no spaces. The fourth element is the addition of **'-n'** if this entry is not to be displayed in a legend. There should be no spaces in any of the entries. The third element of the entry allows the user to change the name assigned to any of the display patterns in the program and therefore can show any geology/basal sediment within the bounds of the patterns provided. New patterns can be added by the author if deemed necessary.

Table 5.3. Geology/basal sediment terms and entries in the supplied FICTITIOUS_ALT_A_PARA.csv file. Note the addition of '-n' to those entries that are not required to be part of the legend if the legend has been requested.

Geology or basal sediment	
Coal**	black*black*Coal-n
Limestone**	black*white*Limestone-n
Marl**	black*white*Marl-n
Metamorphic**	black*white*Metamorphic-n
Mudstone**	black*white*Mudstone-n
Sandstone**	black*white*Sandstone
Shale**	black*white*Shale-n
Siltstone**	black*white*Siltstone-n
Till**	black*white*Till-n
Volcanic**	black*white*Volcanic-n

Examples of the geological/basal sediment symbols used in the program are shown in Figure 5.11. A simple black and white version is shown first and then some unlikley colour combinations simply to demonstrate what is possible.

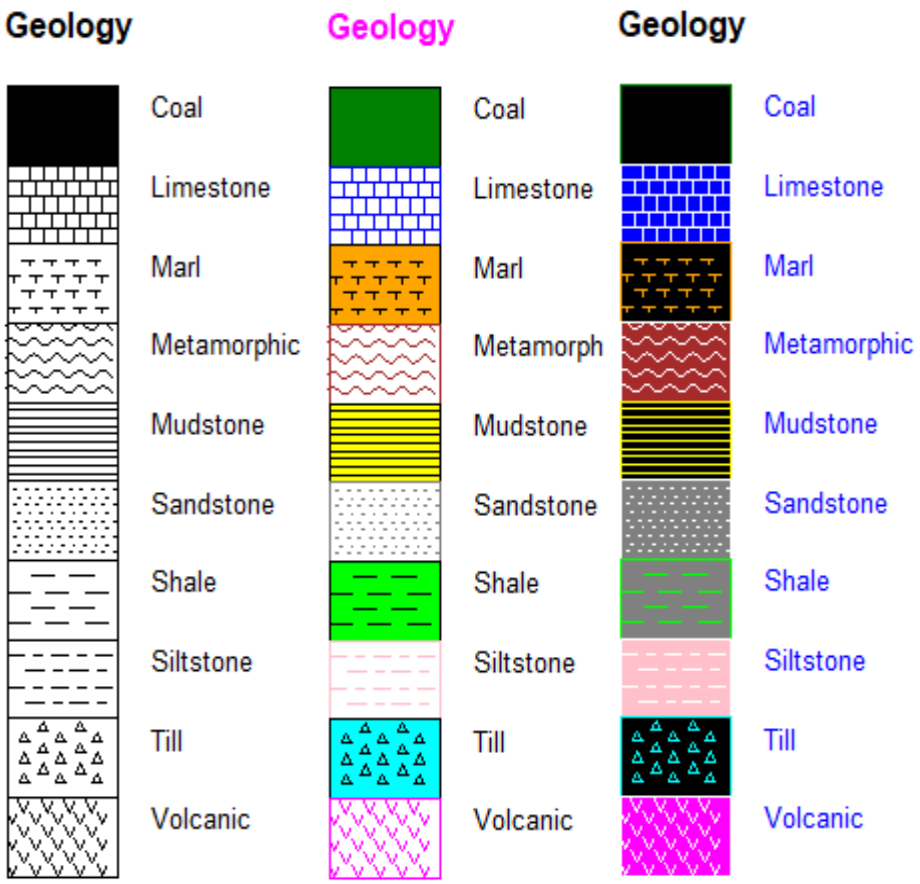


Figure 5.11. Examples of the geology symbols available in PPSP in a legend and possible changes in colour.

5.1.12 GEOLOGY/BASAL SEDIMENT LEGEND PARAMETERS

Here the user can provide entries for parameters related to displaying geology/basal sediment legend.

legend_on_off_geo**

The user must supply either '**on**' or '**off**' here.

legend_title_on_off_geo

The user can indicate if a geology/basal sediment legend title is required. Any title will only be displayed on the figure if legend_on_off_geo** is also 'on'.

legend_title_geo

The user can supply a title for the geology/basal sediment legend if required. It will only be displayed on the figure if legend_on_off_geo** is 'on'.

legend_title_size_geo

The user can specify a font size for the geology/basal sediment legend title.

legend_title_style_geo

The user can specify a style for the geology/basal sediment legend title text. Options are '**normal**', '**bold**' or '**italic**'.

legend_title_colour_geo

User can supply a colour for the geology/basal sediment legend title text. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

legend_title_v_adjust_geo

The geology/basal sediment legend title text will be placed in a default position above the legend features on the figure. Here the position can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

legend_title_h_adjust_geo

The geology/basal sediment legend title text will be placed in a default position above the legend features on the figure. Here the position can be adjusted horizontally if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

legend_x_position_geo and **legend_y_position_geo**

If a legend for the geology/basal sediment elements is required, the user must supply the x and y positions, so the program knows where to plot the legend. **legend_x_position_geo** and **legend_y_position_geo** are based on distances in mm from a known point on the figure (the x/y axis intersection, point A). See example in figure 5.4 for Troels Smith legend.

legend_font_size_geo

The user can specify a font size for von Post legend text.

legend_font_style_geo

The user can specify a text style. Options are '**normal**', '**bold**' or '**italic**'.

legend_text_colour_geo

User can supply a colour for the geology/basal sediment legend text. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

legend_section_height_geo

User can specify the height of each geology/basal sediment legend item box in mm.

legend_section_width_geo

User can specify the width of each geology/basal sediment legend item box in mm.

legend_label_v_adjust_geo

The von Post legend labels will be placed in a default position close to the associated legend box on the figure. They can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

legend_label_h_adjust_geo

The von Post legend labels will be placed in a default position close to the associated legend box on the figure. Here they can be adjusted horizontally if required.

Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title to the right, negative values to the left.

5.1.13 Charcoal

Here the user can provide entries for parameters related to displaying charcoal data in presence absence form.

charcoal_on_off**

The user can choose to display charcoal presence/absence recorded in the field. User must supply either '**on**' or '**off**'.

charcoal_width

The user can specify the width of the charcoal sections. Entries will be in mm. In figure 5.9 they are the same as the ts_width_section** entry which is a sensible option to start with.

charcoal_colour

Users can specify the colour used for the charcoal display. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

charcoal_line_colour

Users can specify the colour used for the line around the charcoal display. Users should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation). White was used in the example in figure 5.9.

gap_between_TS_and_charcoal

As for gap_between_TS_and_vp this parameter allows the user to specify the distance in mm that the charcoal column should be, if specified, from the last Troels Smith column of data in each core (Figure 5.10). Values are in mm.

5.1.14 Other

Here the user can provide entries for parameters related to displaying another dataset in presence absence form as that for charcoal.

other_on_off**

The user can choose to display an 'other' element in presence/absence terms recorded in the field. User must supply either '**on**' or '**off**'. This could be anything. In the example below evidence of *Phragmites* has been displayed. Figure 5.9 shows all the elements that can be displayed at present, including the Troels Smith, geology/basal sediment, charcoal and 'other', in this case *Phragmites*.

other_width

The user can specify the width of the 'other' sections. Entries will be in mm. In figure 5.9. they are the same as the ts_width_section** entry which is a sensible option to start with.

other_colour

Users can specify the colour used for the other display. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

other_line_colour

Users can specify the colour used for the line around the other display. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation). White was used in the example in figure 5.12.

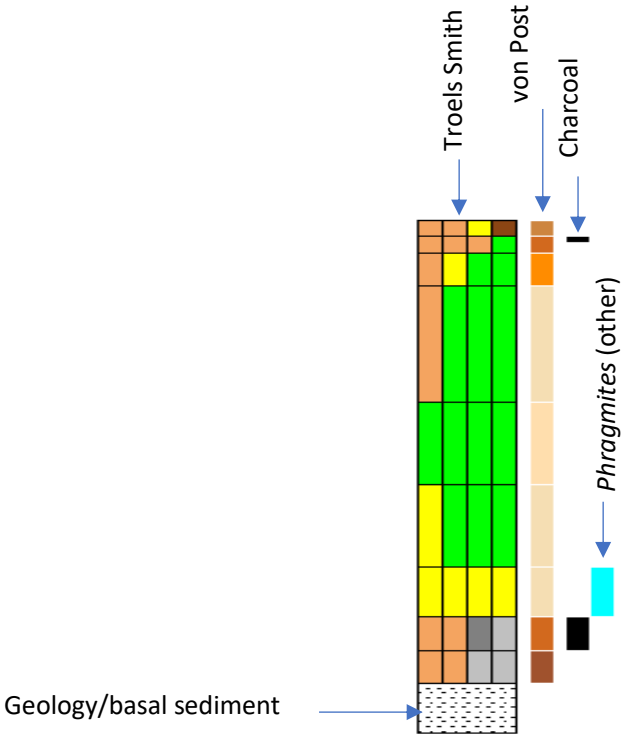


Figure 5.12. An example of where Troels Smith, von Post, charcoal and other data are placed relative to each other.

gap_between_TS_and_other

As for gap_between_TS_and_vp this parameter allows the user to specify the distance in mm that the 'other' column should be, if specified, from the last Troels Smith column of data in each core (Figure 5.13). Values are in mm.

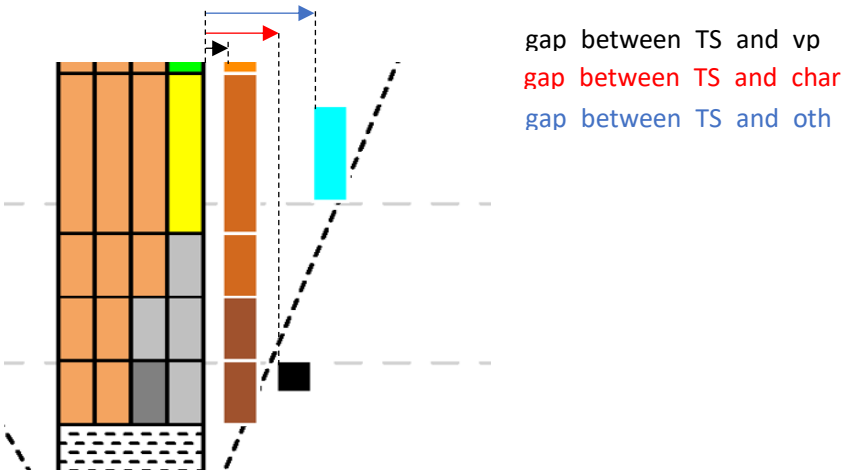


Figure 5.13. Distances from the end of the Troels Smith data for, von Post, charcoal and other data if specified. Values are supplied by the user in the gap_between_TS_and_vp, gap_between_TS_and_charcoal and gap_between_TS_and_other parameters and in mm.

5.1.15 Core labels

A recent inclusion in PPSP program v1.0.3 and greater core labels can be listed in the data file and parameters given to aid display in the parameter file.

core_label_on_off**

The user can choose to display core labels here. User must supply either '**on**' or '**off**'.

core_label_size

The user can specify a font size for the core label text.

core_label_style

The user can specify a style for the core label text. Options are '**normal**', '**bold**' or '**italic**'.

core_label_colour

User can supply a colour for the core label text. User should select from the possible named colours in the matplotlib package (List of named colors — Matplotlib 3.10.0 documentation).

core_label_v_adjust

The core label text will be placed in a default position above the legend features on the figure. Here the position can be adjusted vertically if required. Adjustments are in mm. Zero (**0**) if no adjustment is required. Positive values move the title upwards, negative values downwards.

core_label_h_adjust

The core label text will be placed in a default position above the legend features on the figure. Here the position can be adjusted horizontally if required. Adjustments

are in mm. Zero (**0**) if no adjustment is required. Positive values move the text to the right, negative values to the left.

6. Displaying cores against depth

PPSP is primarily designed to display cores altitudinally. However, there are circumstances where the altitudinal difference between the cores in a transect maybe too large to allow a good depiction of detailed stratigraphy on a single figure such as when all cores from the Keighley Moor transect are displayed together (Figure 7.1). There are two solutions to this. The user can either split the transect into two and show two figures or they can decide to display the cores against depth instead. Here core surfaces would all be plotted as 0 m and the depths would be positive numbers in metres below this level. This has been carried out for the Keighley Moor example (KM_ALL_DEPTH.csv and KM_ALL_DEPTH_PARA.csv) where all 9 cores are plotted with 0 m as the surface (Figure 7.2). A separate figure could be created independently by the user to show where these cores existed on a slope or undulating surface such as that in figure 6.1.

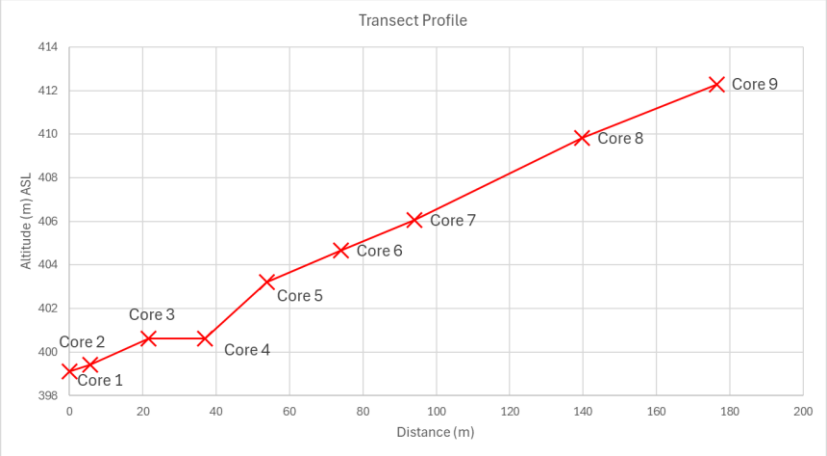


Figure 6.1. A figure that could be created by the user to show the surface topography of the transect if they choose to display the cores vs depth.

To plot figures against depth in PPSP a few deviations from the usual procedure of configuration are required. Supplied in the PPSP download is a data file (KM_ALL_DEPTH.csv) and parameter file (KM_ALL_DEPTH_PARA.csv) for the full Keighley Moor example with all nine cores.

6.1 Changes required to Data and Parameter files

Data file

1) Normally altitudes for the surface of the core are provided and then the depths of each section subtracted from that would be supplied as in figure 6.2a. However, when plotting against depth with 0 as the surface the altitude is given as 0 for the surface and then successive sections are subtracted from this. In figure 6.2a core 1, plotted for altitude, has entries from 399.11 to 395.77, a total of 3.34 m. When plotting vs depth these are altered as in figure 6.2b from 0 to - 3.34.

2) This must also be carried out for Troels Smith, charcoal and 'other' data. The altitude and depth version for these for cores 1 and 2 are evident in figures 6.2a and b.

Parameter file

1) **y_maj_ticks**** parameter must be altered so that 0 is the first entry followed by the ticks required as **minus numbers**. In the KM_ALL_DEPTH.csv data example entries are as below.

5	y_maj_ticks**	0*-0.5*-1*-1.5*-2*-2.5*-3*-3.5

Here depths are from 0 to -3.5 as the range of all the nine core depths is 0 to 3.34m depth. Although the values must be given here as minus values the program will display them as positive numbers if **y_maj_ticks_depth_mode**** entry is **'on'.**

2) **y_maj_ticks_depth_mode**** must be given an entry of **'on'.**

6.2 Displaying against depth with, a core /some cores, below the surface (0 m) or with unrecovered upper sections.

In some situations, it is possible that cores the user wishes to display against depth may have the upper section missing potentially because it was not recovered when coring. If this happens, or for some other reason the user would like their cores not to start at 0 m when displaying against depth, there is a solution to this. The user can employ the unrecovered option within PPSP.

In figure 6.3 there is a version of figure 7.4. The latter is displayed against depth with a full content in all cores up to 0 m. However, the former displays the same data but with the first and fourth core's data shifted downwards by 0.2 m. This is to simulate a) a possible section above that was unrecovered or b) that the user would just like to start this core data at -0.2 m.

This cannot be achieved by starting the core depths in the data file with -0.2 as the first depth entry.

There **must be** entries listed from 0 m for PPSP to work when plotting in 'against depth' mode. Figure 6.4 shows the entries in the data file (this file has been added to the zenodo site KM_C01_05_DEPTH_UNREC.csv) used to achieve the plot in Figure 6.3. Here the missing or unwanted display depths, in this case from 0 to -0.2 m, are entered in the data file as unrecovered using 'UR' in the TS_geology_basal column and by adding 'Ur-Ur-Ur-Ur' in the TS_description column (as shown previously for unrecovered sections, see section 4.1.1). If the user is also displaying von Post data an entry of '0' will be required for the section in question.

The unrecovered or empty section can be displayed as a coloured fill area, with or without a boundary line, or as empty space by changing options in the parameter file (section 5.1.7). The format used will be reproduced in the legend if a legend is requested. If it is not an

unrecovered section, the user can add an alternative legend entry for the **Unrecovered alt**** option or have it as a blank space. If the alternative legend entry is activated all entries used in the figure will require an entry. Here if the user does not want any label in the legend, then a few spaces should be entered in the options (Figure 6.5). This is the only entry in the alternative name section that is allowed to have a space as an entry. Errors will be derived elsewhere.

a)

Altitude_m	Core_number	x_location_m	TS_geology_basal	TS_description	von_Post	Altitude_m_charcoal	Core_number_charcoal	Charcoal	Altitude_m_other	Core_number_other	other
399.11	1	0	TS	Sh-Tl-Tl-Th	6	399.11	1	0	399.11	1	0
399.05	1	0	TS	Sh-Sh-Sh-Tl	7	396.48	1	1	396.53	1	2
398.97	1	0	TS	Th-Th-Tb-Tb	3	396.17	1	0	396.48	1	0
398.54	1	0	TS	Sh-Sh-Th-Tb	4	399.43	2	1	399.43	2	0
398.05	1	0	TS	Sh-Sh-Th-Th	4	399.38	2	0	400.632	3	0
397.36	1	0	TS	Sh-Sh-Sh-Th	6	399	2	1	399.362	3	0
396.53	1	0	TS	Sh-Sh-Sh-Th	7	398.71	2	0	398.942	3	2
396.48	1	0	TS	Sh-Sh-Sh-Sh	8	400.63	3	0	400.632	4	0
396.17	1	0	TS	Gg(min)-Gg(min)-Ag-Ag	0	400	3	1	403.222	5	0
396.07	1	0	GEO_sandstone	0-0-0-0	0	399.58	3	0	404.674	6	0
395.77	1	0		0-0-0-0	0	400.63	4	0	406.064	7	0
399.43	2	5.7	TS	Sh-Tl-Th-Tb	6	400.08	4	1	409.822	8	0
399.38	2	5.7	TS	Sh-Sh-Tl-Th	6	399.71	4	0	412.292	9	0
399.31	2	5.7	TS	Sh-Th-Tb-Tb	6	403.22	5	1			
399.24	2	5.7	TS	Th-Tb-Tb-Tb	4	403.142	5	0			
399.07	2	5.7	TS	Sh-Tl-Th-Th	5	403.11	5	1			
398.85	2	5.7	TS	Sh-Tl-Th-Th	6	403.05	5	0			
398.28	2	5.7	TS	Th-Th-Tb-Tb	6	402.61	5	1			
397.9	2	5.7	TS	Sh-Sh-Th-Tb	7	402.29	5	0			
397.61	2	5.7	GEO_siltstone	0-0-0-0	0	401.5	5	1			
397.31	2	5.7		0-0-0-0	0	401.452	5	0			

b)

Altitude_m	Core_number	x_location_m	TS_geology_basal	TS_description	von_Post	Altitude_m_charcoal	Core_number_charcoal	Charcoal	Altitude_m_other	Core_number_other	other
0	1	40	TS	Sh-Tl-Tl-Th	6	0	1	0	0	1	0
-0.06	1	40	TS	Sh-Sh-Sh-Tl	7	-2.63	1	1	-2.58	1	2
-0.14	1	40	TS	Th-Th-Tb-Tb	3	-2.94	1	0	-2.63	1	0
-0.57	1	40	TS	Sh-Sh-Th-Tb	4	0	2	1	0	2	0
-1.06	1	40	TS	Sh-Sh-Th-Th	4	-0.05	2	0	0	3	0
-1.75	1	40	TS	Sh-Sh-Sh-Th	6	-0.43	2	1	-1.27	3	0
-2.58	1	40	TS	Sh-Sh-Sh-Th	7	-0.72	2	0	-1.69	3	2
-2.63	1	40	TS	Sh-Sh-Sh-Sh	8	0	3	0	0	4	0
-2.94	1	40	TS	Gg(min)-Gg(min)-Ag-Ag	0	-0.63	3	1	0	5	0
-3.04	1	40	GEO_sandstone	0-0-0-0	0	-1.05	3	0	0	6	0
-3.34	1	40		0-0-0-0	0	0	4	0	0	7	0
0	2	45.7	TS	Sh-Tl-Th-Tb	6	-0.55	4	1	0	8	0
-0.05	2	45.7	TS	Sh-Sh-Tl-Th	6	-0.92	4	0	0	9	0
-0.12	2	45.7	TS	Sh-Th-Tb-Tb	6	0	5	1			
-0.19	2	45.7	TS	Th-Tb-Tb-Tb	4	-0.078	5	0			
-0.36	2	45.7	TS	Sh-Tl-Th-Th	5	-0.11	5	1			
-0.58	2	45.7	TS	Sh-Tl-Th-Th	6	-0.17	5	0			
-1.15	2	45.7	TS	Th-Th-Tb-Tb	6	-0.61	5	1			
-1.53	2	45.7	TS	Sh-Sh-Th-Tb	7	-0.93	5	0			
-1.82	2	45.7	GEO_sandstone	0-0-0-0	0	-1.72	5	1			
-2.12	2	45.7		0-0-0-0	0	-1.768	5	0			

Figure 6.2. Data file entries for cores 1 and 2 for KM_ALL data displayed vs a) altitude and b) depth.

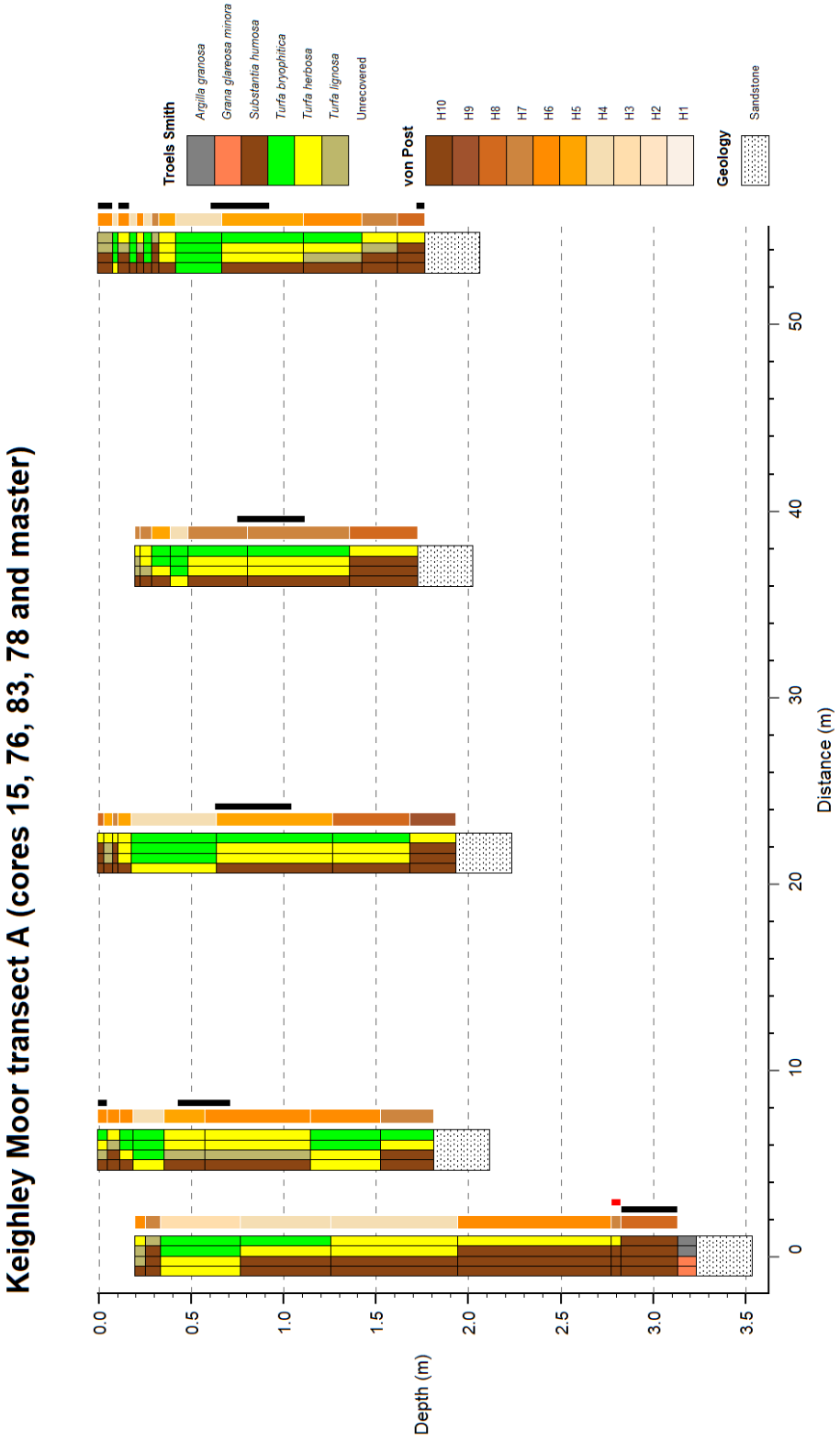


Figure 6.3. This is a repeat of the data in Figure 7.4 from the KM_C01_05_DEPTH example. Here however the first and fourth core has been plotted at 0.2m below the 0 m surface. This is in part to simulate if another hypothetical section above was unrecovered or simply a way to show how when displayed against depth a few cores can be plotted to appear below this level. The program, when plotting in this mode, was built to draw everything from a surface of 0 m. This demonstrates how this can be adjusted if the user wishes. Cases where this is necessary are likely to be few.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Altitude_m	Core_number	Location_m	TS_geology_basal	TS_description	von_Post		Altitude_m_charcoal	Core_number_charcoal	Charcoal		Altitude_m_other	Core_number_other	other		Core_label	Core_number_label
2	0	1	40	UR	Ur-Ur-Ur-Ur	0		0	1	0		0	1	0		15	1
3	-0.2	1	40	TS	Sh-Tl-Tl-Th	6		-2.83	1	1		-2.78	1	2		76	2
4	-0.26	1	40	TS	Sh-Sh-Sh-Tl	7		-3.14	1	0		-2.83	1	0		83	3
5	-0.34	1	40	TS	Th-Th-Tb-Tb	3		0	2	1		0	2	0		78	4
6	-0.77	1	40	TS	Sh-Sh-Th-Tb	4		-0.05	2	0		0	3	0		M	5
7	-1.26	1	40	TS	Sh-Sh-Th-Th	4		-0.43	2	1		-1.27	3	0			
8	-1.95	1	40	TS	Sh-Sh-Sh-Th	6		-0.72	2	0		-1.69	3	2			
9	-2.78	1	40	TS	Sh-Sh-Sh-Th	7		0	3	0		0	4	0			
10	-2.83	1	40	TS	Sh-Sh-Sh-Sh	8		-0.63	3	1		0	5	0			
11	-3.14	1	40	TS	Gg(min)-Gg(min)-Ag-Ag	0		-1.05	3	0							
12	-3.24	1	40	GEO_sandstone	0-0-0-0	0		0	4	0							
13	-3.54	1	40		0-0-0-0	0		-0.75	4	1							
14	0	2	45.7	TS	Sh-Tl-Th-Tb	6		-1.12	4	0							
15	-0.05	2	45.7	TS	Sh-Sh-Tl-Th	6		0	5	1							
16	-0.12	2	45.7	TS	Sh-Th-Tb-Tb	6		-0.078	5	0							
17	-0.19	2	45.7	TS	Th-Tb-Tb-Tb	4		-0.11	5	1							
18	-0.36	2	45.7	TS	Sh-Tl-Th-Th	5		-0.17	5	0							
19	-0.58	2	45.7	TS	Sh-Tl-Th-Th	6		-0.61	5	1							
20	-1.15	2	45.7	TS	Th-Th-Tb-Tb	6		-0.93	5	0							
21	-1.53	2	45.7	TS	Sh-Sh-Th-Tb	7		-1.72	5	1							
22	-1.82	2	45.7	GEO_sandstone	0-0-0-0	0		-1.768	5	0							
23	-2.12	2	45.7		0-0-0-0	0											
24	0	3	61.6	TS	Sh-Sh-Sh-Th	8											
25	-0.03	3	61.6	TS	Sh-Tl-Tl-Th	5											
26	-0.08	3	61.6	TS	Sh-Sh-Sh-Th	7											
27	-0.11	3	61.6	TS	Sh-Th-Th-Th	5											
28	-0.18	3	61.6	TS	Th-Tb-Tb-Tb	4											
29	-0.64	3	61.6	TS	Sh-Th-Th-Tb	5											
30	-1.27	3	61.6	TS	Sh-Th-Th-Tb	8											
31	-1.69	3	61.6	TS	Sh-Sh-Sh-Th	9											
32	-1.94	3	61.6	GEO_sandstone	0-0-0-0	0											
33	-2.24	3	61.6		0-0-0-0	0											
34	0	4	77	UR	Ur-Ur-Ur-Ur	0											
35	-0.2	4	77	TS	Sh-Tl-Tl-Th	7											
36	-0.23	4	77	TS	Sh-Tl-Th-Th	7											
37	-0.29	4	77	TS	Sh-Th-Tb-Tb	5											
38	-0.39	4	77	TS	Th-Tb-Tb-Tb	4											
39	-0.49	4	77	TS	Sh-Th-Th-Tb	7											
40	-0.81	4	77	TS	Sh-Th-Th-Tb	7											
41	-1.36	4	77	TS	Sh-Sh-Sh-Th	8											
42	-1.73	4	77	GEO_sandstone	0-0-0-0	0											
43	-2.03	4	77		0-0-0-0	0											
44	0	5	93.8	TS	Sh-Sh-Tl-Tl	6											
45	-0.08	5	93.8	TS	Th-Tb-Tb-Tb	4											
46	-0.11	5	93.8	TS	Sh-Sh-Tl-Th	6											
47	-0.17	5	93.8	TS	Sh-Tb-Tb-Tb	4											
48	-0.21	5	93.8	TS	Sh-Sh-Tl-Th	6											
49	-0.25	5	93.8	TS	Sh-Tb-Tb-Tb	4											
50	-0.29	5	93.8	TS	Sh-Sh-Sh-Tl	7											
51	-0.33	5	93.8	TS	Sh-Th-Th-Th	5											
52	-0.42	5	93.8	TS	Tb-Tb-Tb-Tb	4											
53	-0.67	5	93.8	TS	Sh-Th-Th-Tb	5											
54	-1.11	5	93.8	TS	Sh-Tl-Th-Tb	6											
55	-1.43	5	93.8	TS	Sh-Sh-Tl-Th	7											
56	-1.62	5	93.8	TS	Sh-Sh-Sh-Th	8											
57	-1.77	5	93.8	GEO_sandstone	0-0-0-0	0											
58	-2.07	5	93.8		0-0-0-0	0											

Figure 6.4. Entries in the data file KM_C01_05_DEPTH_UNREC.csv to create the image in figure 6.3. See entries in associated parameter file KM_C01_05_DEPTH_UNREC_PARA.csv also.

146	Use alternative TS name**	on
147		
148	Argilla steatodes alt**	Argilla steatodes-n
149	Argilla granosa alt**	Argilla granosa
150	Grana arenosa alt**	Grana arenosa-n
151	Grana saburralia alt**	Grana saburralia-n
152	Grana glareosa minora alt**	Grana glareosa minora
153	Grana glareosa majora alt**	Grana glareosa majora
154	Detritus granosus alt**	Detritus granosus-n
155	Detritus herbosus alt**	Detritus herbosus-n
156	Detritus lignosus alt**	Detritus lignosus-n
157	Limus calcareus alt**	Limus calcareus-n
158	Limus detrituosus alt**	Limus detrituosus-n
159	Limus ferrugineus alt**	Limus ferrugineus-n
160	Particulae testae molloscorum alt**	Particulae testae molloscorum-n
161	Substantia humosa alt**	Substantia humosa
162	Turfa lignosa alt**	Turfa bryophitica
163	Turfa herbosa alt**	Turfa herbosa
164	Turfa bryophitica alt**	Turfa lignosa
165	Unrecovered alt**	
166		

Figure 6.5. Alternative names are used here to achieve the output shown in figure 6.4 where the unrecovered option is used to create a blank space for cores 1 and 4 but no entry in the legend is visible and there is no text as a couple of spaces are added to the Unrecovered alt option here. This is the only option here that allows spaces only. An error will be issued if spaces are used for other options.**

7. Outputs from supplied data and parameter files

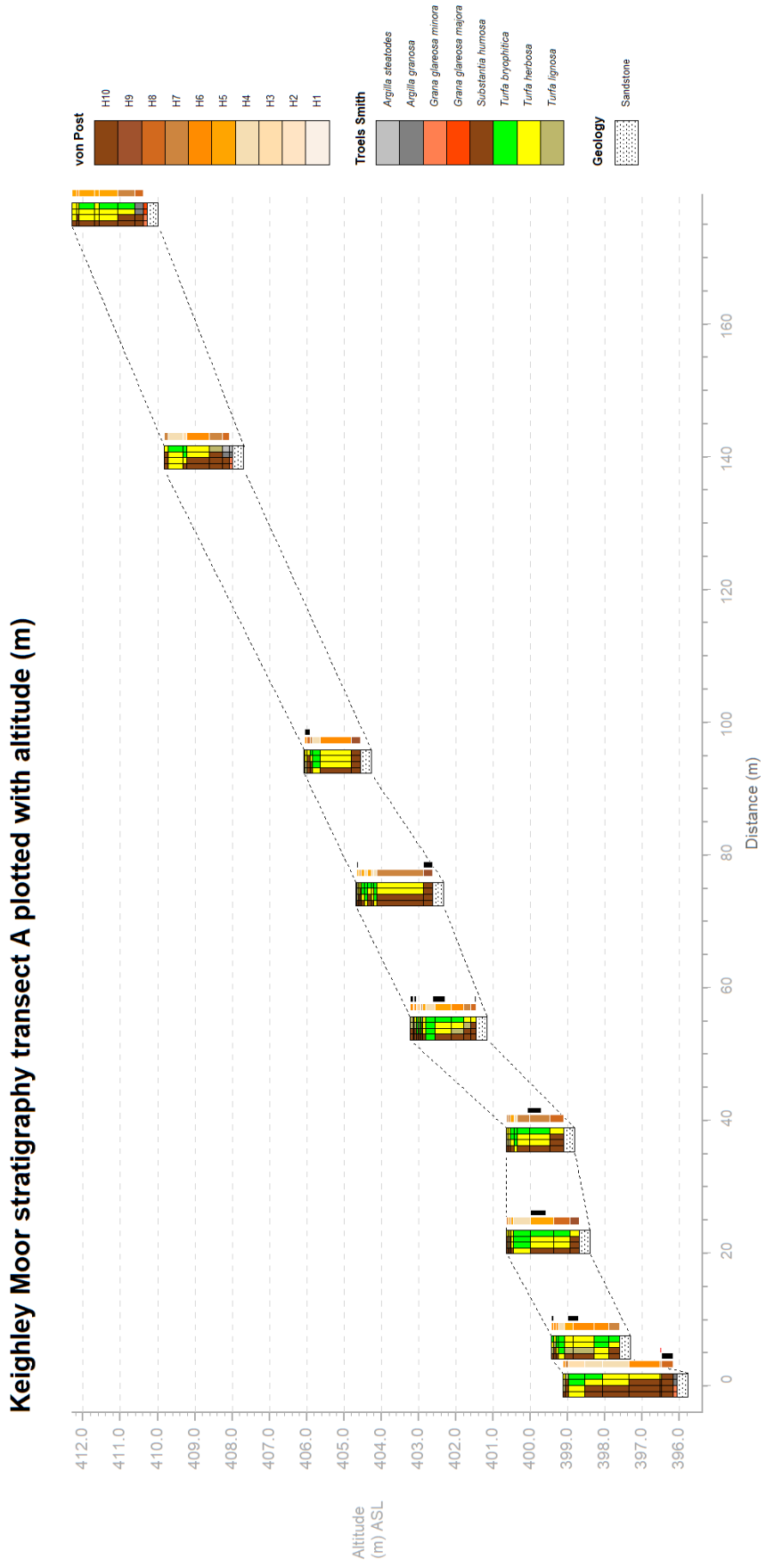


Figure 7.1. Figure of all 9 KM cores vs altitude (KM_ALL_ALT.csv, KM_ALL_ALT_PARA.csv)

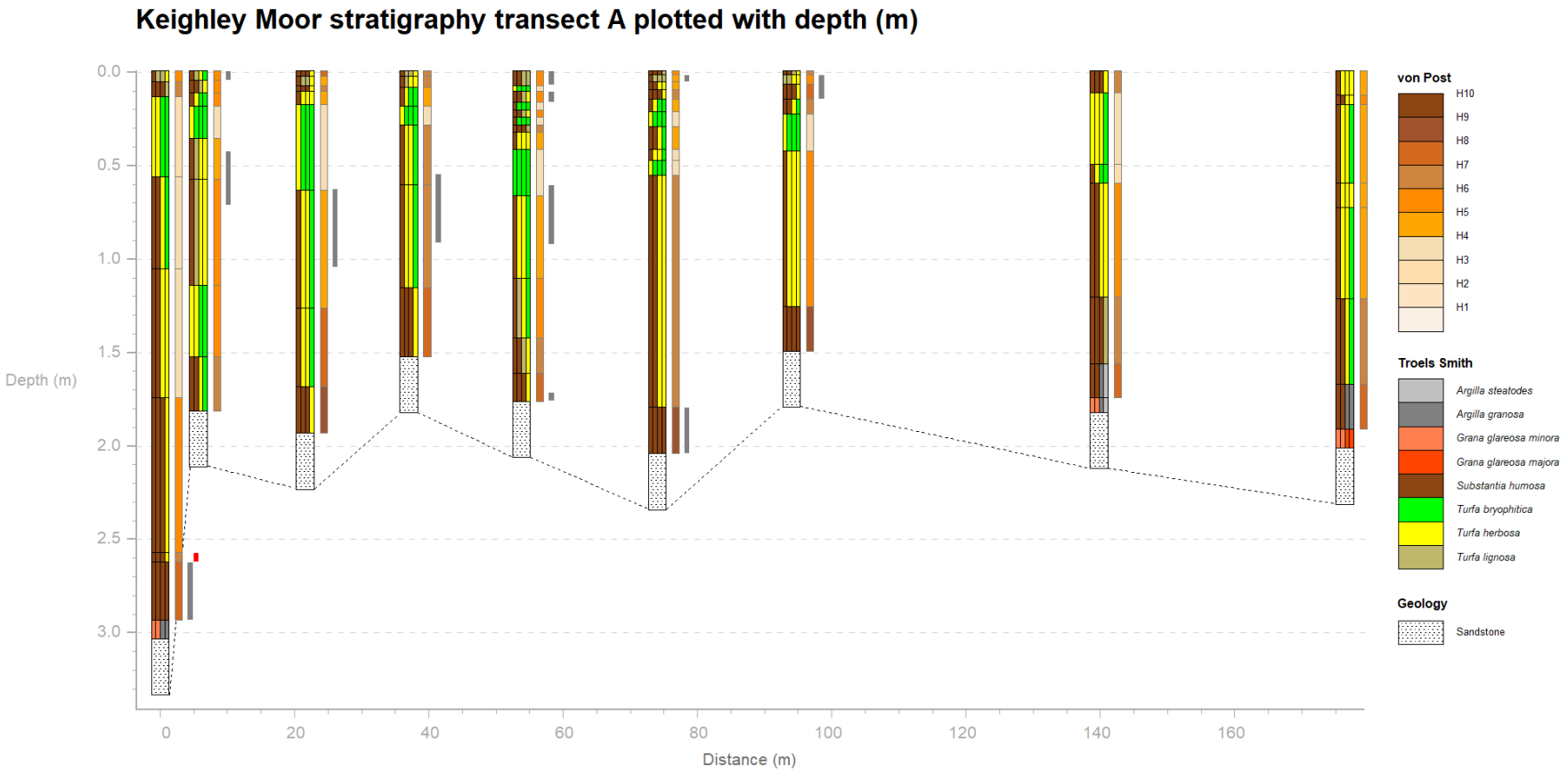


Figure 7.2. Figure of all 9 KM cores vs depth (KM_ALL_DEPTH.csv, KM_ALL_DEPTH_PARA.csv)

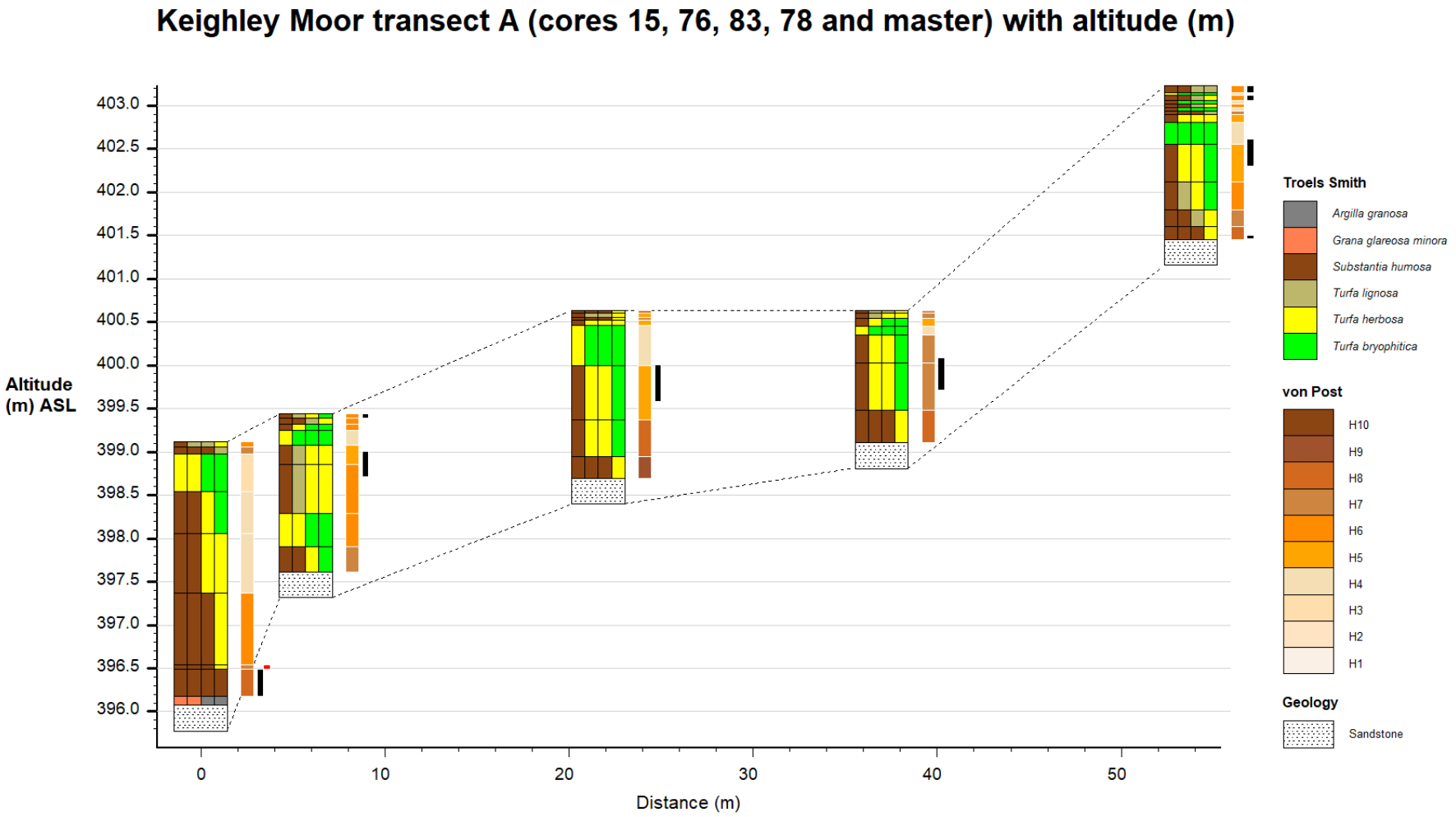


Figure 7.3. Figure of KM cores 1 to 5 vs altitude (KM_C01_05_ALT.csv, KM_C01_05_ALT_PARA.csv)

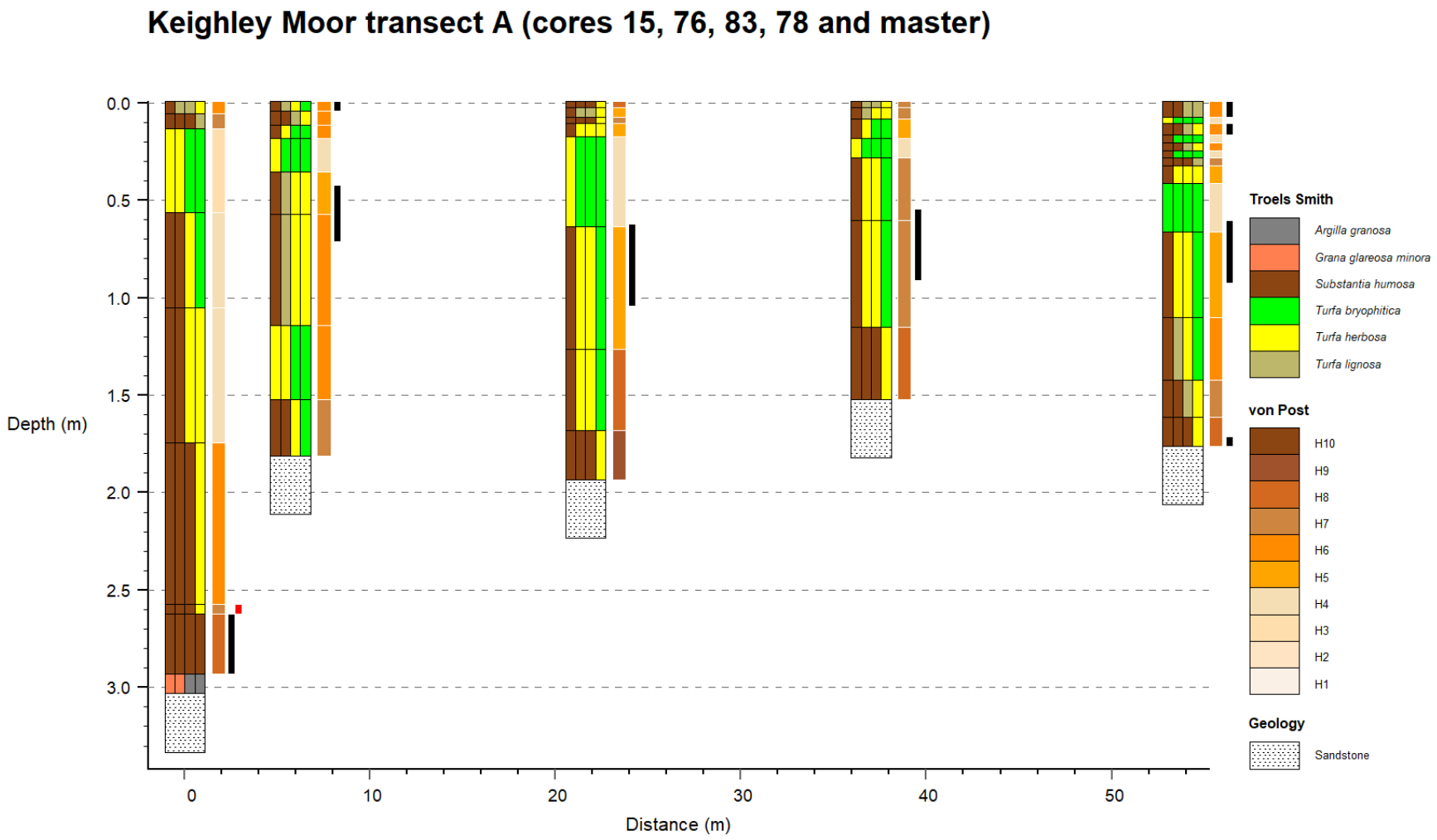


Figure 7.4. Figure of KM cores 1 to 5 vs depth (KM_C01_05_DEPTH.csv, KM_C01_05_DEPTH_PARA.csv)

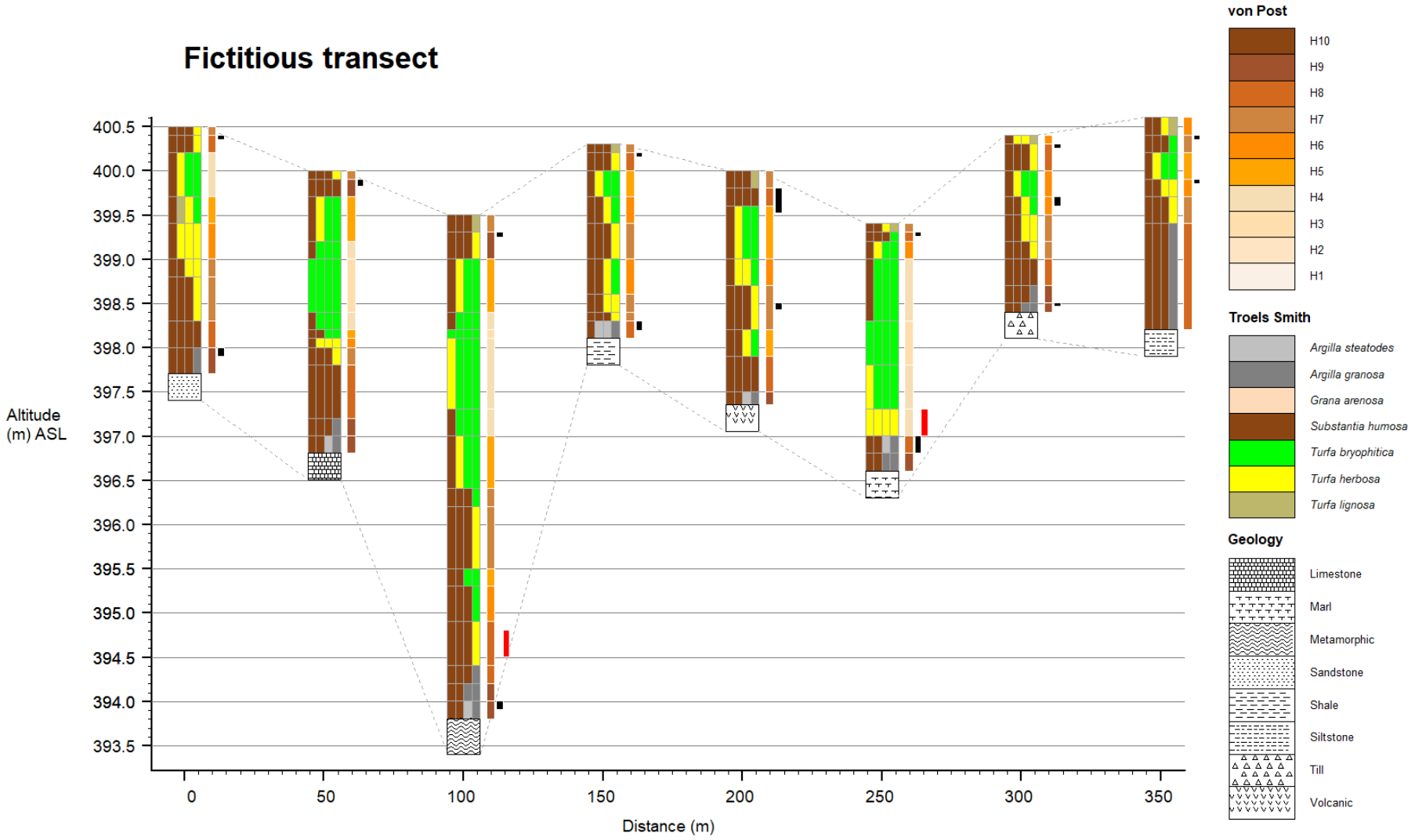


Figure 7.5. Figure of FICTITIOUS vs altitude (FICTITIOUS_ALT_A.csv, FICTITIOUS_ALT_PARA_A.csv).

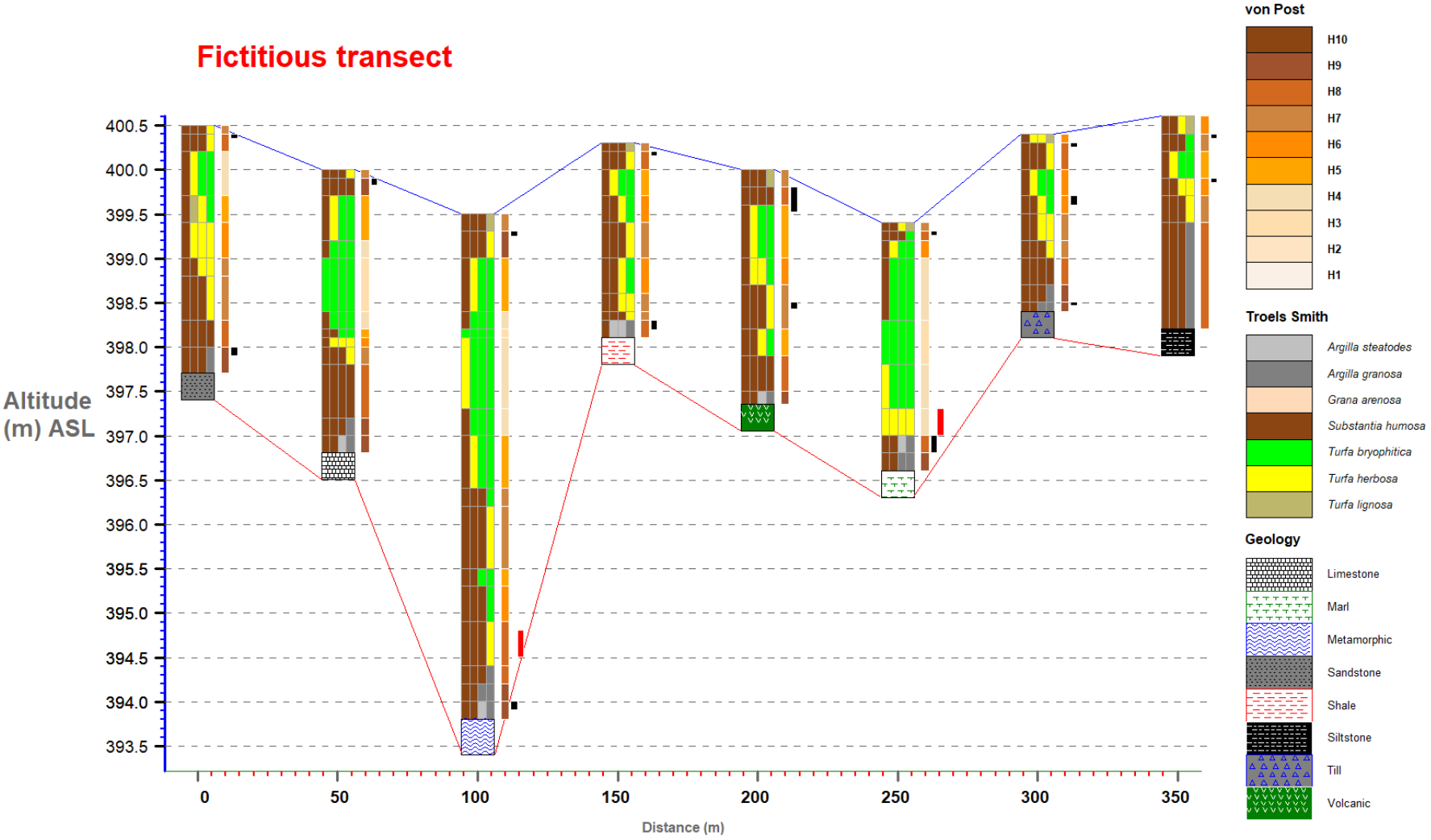


Figure 7.6. Figure of FICTITIOUS vs altitude (FICTITIOUS_ALT_B.csv, FICTITIOUS_ALT_B_PARA.csv). Different colours and fonts have been used to show some further aesthetic changes that can be made.

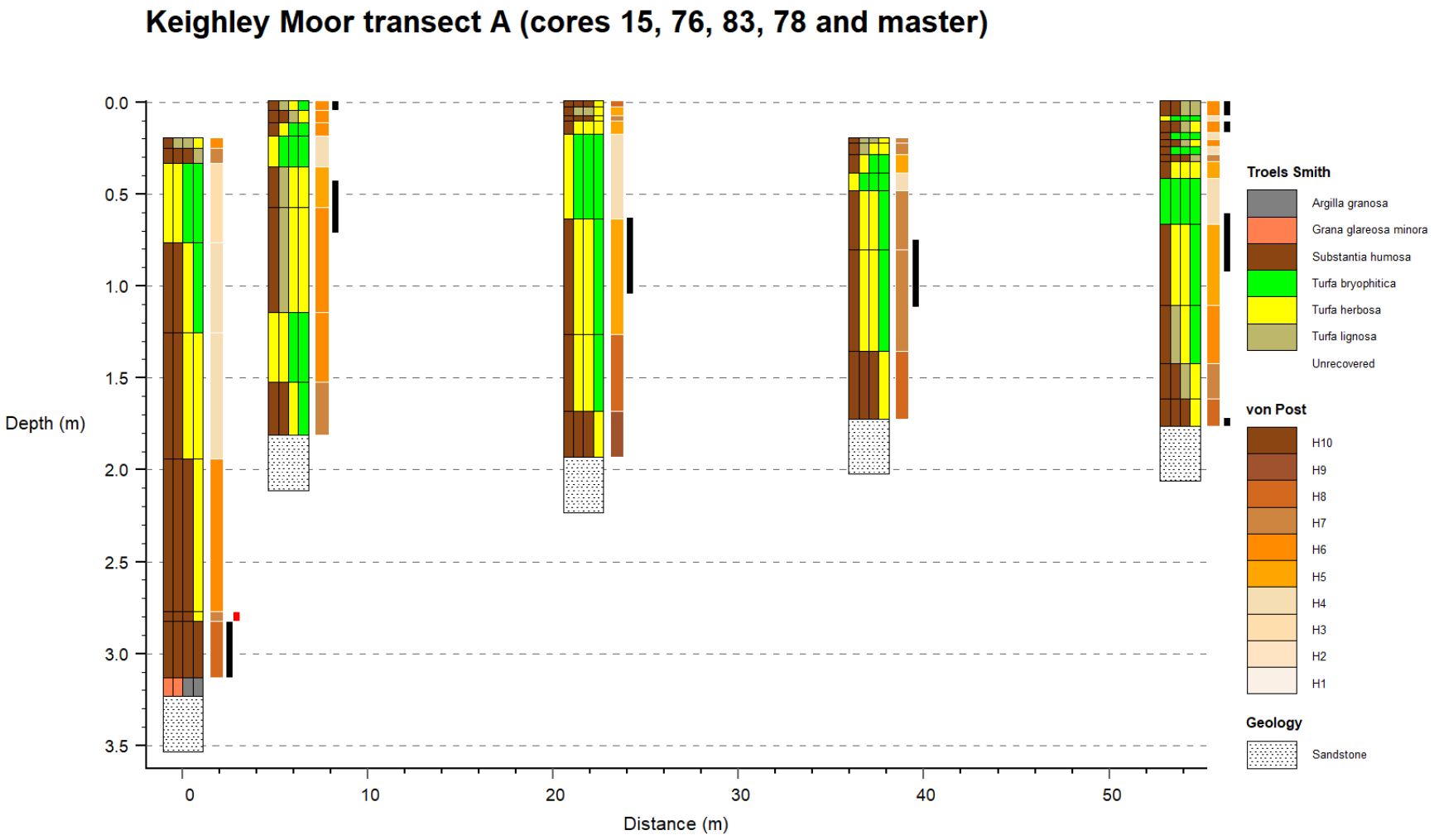


Figure 7.7. Figure of KM cores 1 to 5 vs depth (KM_C01_05_DEPTH_UNREC.csv, KM_C01_05_DEPTH_UNREC_PARA.csv) showing unrecovered sections.

8. Accessibility

The figures shown previously are very colourful and show what the program can produce. However, it is acknowledged that people who are or have varying types of colour blindness may find it challenging to decipher the different elements.

This program is primarily designed for use on peat cores. With peat cores the organic parts are only likely to have four parts in the TS scheme (Tb, Tl, Th or Sh). The contact between the peat and the mineral layer below may well add further variation if that is to be displayed. Here a combination of As, Ag, Ga, Gs, Gg(min) and Gg(maj) may be encountered. It is possible to display all this in grayscale along with the symbols that are available for the mineral components. An example of KM with depth using grayscale colours is shown in Figure 8.1. If a greyscale is used and von Post data needs to be shown, as in Figure 8.1, it is suggested that some of the von Post levels are aggregated. In Figure 8.1 the same colour is used for groupings of H01 - 02, H03 - 04, H05 - 06, H07 - 08 and lastly H09 - 10.

The colours available in the matplotlib named colour selection in section 5.1.3 would also allow the use of four or five colours (not greyscale) that are more compatible with colour blindness. The user can search the web for appropriate colour schemes and then chose appropriate colours here. For example, gradations of blue are suitable in some cases as are gradations between two colours. The PPSP program gives good flexibility for the user to design their own colour scheme mixed with some symbol elements. Future development of the PPSP program may involve the introduction of more symbols for the other TS elements other than just the mineral ones. However, with the ethos of the programs intended use on peat in mind this is at present not a stumbling block to its usage.

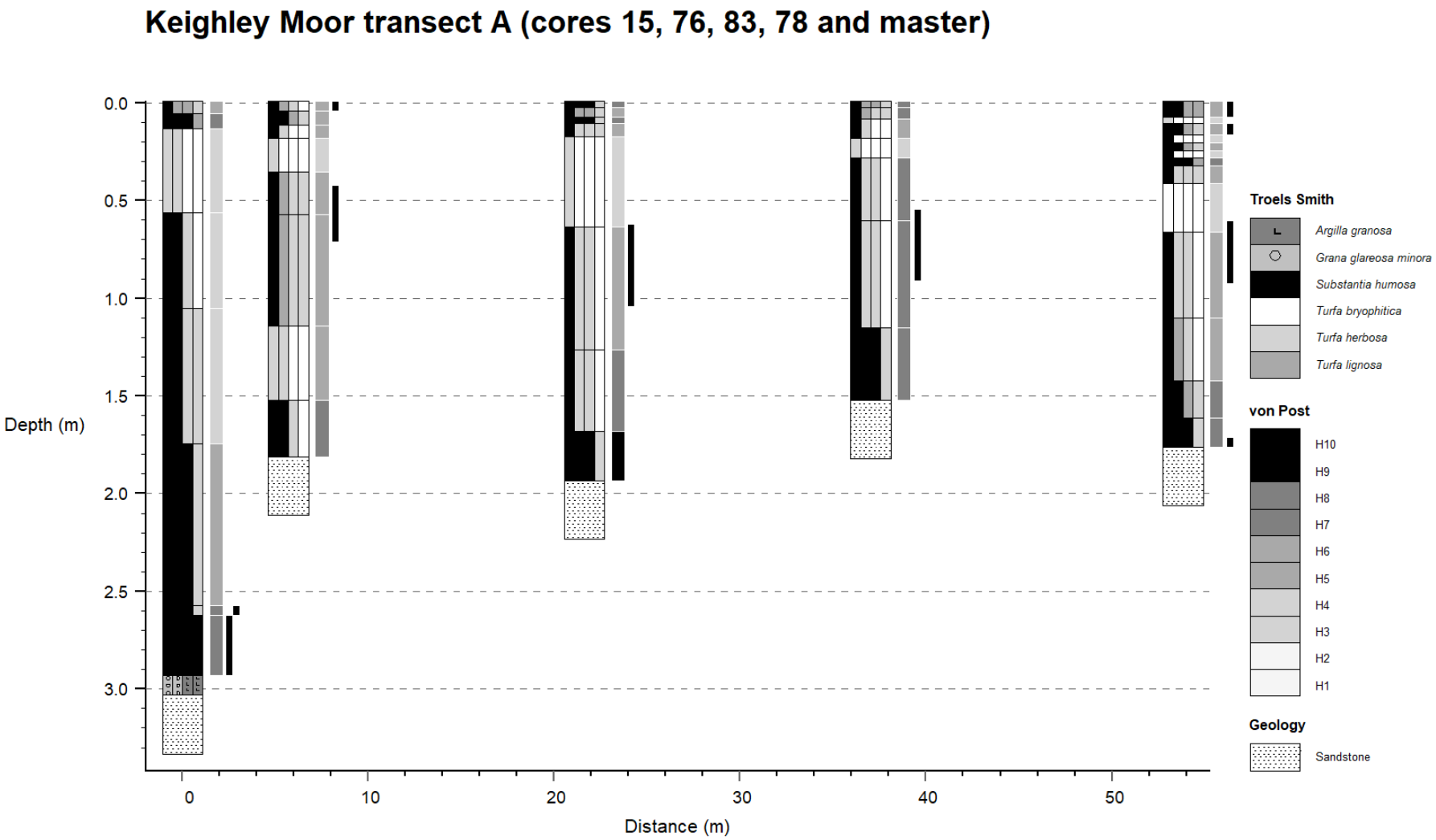


Figure 8.1. Figure of KM cores 1 to 5 vs depth (KM_C01_05_DEPTH.csv, KM_C01_05_DEPTH_PARA.csv) using grey colours and some

9. References

1) Blundell, A., Holden, J., A. 2014. Using palaeoecology to support blanket peatland management. Ecological Indicators 49, 110-120.

2) Troels-Smith, J. 1955. Karakterisering af lose jordater (characterisation of unconsolidated sediments). Denmarks Geologiske Undersogelse, Series IV/3, 10, 73.

3) von Post, L., 1922. Sveriges geologiska undersöknings torvinventering och några av dess hittills vunna resultat. *Svenska mosskulturföreningens tidskrift*, (37).

4) von Post, L., 1924. Das genetische system der organogenen bildungen schwedens. *Memoires sur la nomenclature et la classification des sols. International Committee of Soil Science, Helsinki*, 287-304.