

PaleoTax/Measure

Programme Release 1.8 (May 2022)

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Introduction

What is PaleoTax/Measure?

PaleoTax/Measure (PM) is a tool to measure two-dimensional objects with a size of up to one metre. The resolution of PM is 0.001 mm (1 μm). It is possible to measure distances and areas, and to count objects. The programme is a clone of PaleoTax/Map, but here the total map size is not at global scale, but is an area of 1m². It is (currently) totally independent of PaleoTax. A future version may be made available as a Plug-in for PaleoTax in order to ease the measuring of images administrated by PaleoTax.

Why PaleoTax/Measure?

- PaleoTax/Measure allows, in a very short time span, the recording of a high number of distances and areas of various types (which the user can define), or counting of objects.
- Values obtained through PM are much more accurate than those taken manually with a ruler.
- The programme automatically calculates arithmetic mean, standard deviation, coefficient of variance and the first interval from the obtained values (distances, areas, counts).
- The programme allows to export the measured data as a plain text file (or into the clip board), which makes it easy to import it into any spreadsheet programme.
- Values can be classified and the results can be used in distribution analysis.
- Data can be stored (in ASCII files) and reloaded, modified and completed. Values can be deleted from a table or directly in the image.

What to measure?

PaleoTax/Measure helps to measure any plane object such as photographed leaves, any sectioned or thin-sectioned object, biological preparations, etc. The smallest distance which can be measured is 0.001mm (1 μm). The maximum working area is 1m². The object to be measured must be available as JPG, BMP or GIF file, as black-and-white, 8-bit-greyscale or RGB. The resolution (scale) depends on the size of the object and the expected exactness. If the scale is too large, the work goes slightly slower, because of the size of the image file; if the scale is too small, the object appears blurred and makes exact measurement difficult. Some experience can help to clarify which is the best resolution. To gain a first experience, divide the size of the area in μm (1,000,000) by the smallest value to be measured (in μm). For the smallest distance of 100 μm , the resolution should be about 10,000dpi (1,000,000/100). If the smallest value is 2mm (1,000,000/2,000), the recommended resolution is 500dpi. A slightly higher resolution gives more exact results. Objects to be measured must be available as files. JPG gives smaller files, but it is slower; BMP gives larger files, but it is faster. The maximum size of an image which can be processed depends on the main memory of your computer; if the image is too large, it will simply not be displayed. If it is not possible to quantify that; count 20MB JPG file size for each free 500MB of main memory in your computer, as a maximum.

What is new in this version?

(1.1) Compared to version 1.0 the following important changes were made:

- Display speed is much higher.
- Segments can be deleted from the table or in the image.
- More statistical values are calculated.
- Results are displayed in a table.
- More output formats.

(1.1.1) Compared to version 1.1, the following changes were made:

- The programme works generally better under Windows Vista and higher versions.
- It can be selected which values are given in the Screen output format. The output text can automatically be transferred into the Windows clipboard.
- It has become easier to append new data types.

(1.2) Compared to version 1.1.1, the following changes were made:

- The areas of polygons are now calculated and included in statistics. Points of polygons can be modified and deleted.
- Statistical values for text labels are calculated when the text represents numbers.
- A new data type, 'Count' is introduced.
- A summary of the measured values can be displayed.
- Adaptation to virtual installations of Windows ('graph file read error' can be bypassed, see below *Problems and limitations*), and to Windows 7/8/10.

(1.3) Compared to version 1.2, the following changes were made:

- It is possible to modify the size of the dot when measuring or modifying data (Options/Display/Point size).
- The length of TP Lines can be displayed (Options/Display/Show values of TP Lines).
- Maximum font size for the window of all statistical values can be defined (Options/Display/Max font size statistic).
- Values can be output to be able to be imported by the statistical programme package R.
- Editing values of the count object (remove, add) is possible now. Set the Edit mode, press ALT and click at one point. This point will be duplicated and integrated in the current group. Take care not to use the first and not the last point in the group.

(1.5.) Compared to version 1.3, the following changes were made (version 1.4 was not published):

- The export to PaleoTax/Graph is improved.
- Data of the current characteristic can be exported in the clip board.
- GIF files can be loaded.
- The resolution and the image file can be modified during the work with the programme.
- The resolution can be recalculated when a scanned scale is measured.
- Deleted values are not physically deleted and can be recalled.

(1.6.) Compared to version 1.5, the following changes were made:

- Buttons with the most used data types on the right top of the screen.
- Numerous minor corrections. There is German version of the manual.

(1.7) Compared to version 1.6, the following changes were made:

- There is a better control whether the selected image and resolution combine well.
- The formerly unused level 2 shows now some status data in the left upper corner of the measure area.
- Problems with UHD displays are resolved. Please compare the chapter Problems and limitations.

(1.8) Compared to version 1.7, the following changes were made:

- It is possible to export the current image in the JPG format. The JPG quality can be set in the options.
- Menus and texts are available in the Spanish language too.
- When the programme is started, you are asked for a user name. You may skip this question but it may help to recognise who has created a measure project.
- When data are recorded, a small circle appears in the left upper corner that changes colour – from green to purple – depending on the amount of unsaved data. This is a reminder to save recorded data.
- The font size for buttons, the tables on the right hand side and in some forms was increased.
- The height of the statistics and histogramme boxes can be set manually

Equations

Arithmetic mean (μ) :

$$\frac{\sum_{i=1}^n x_i}{n}$$

Variance (σ^2) :

$$\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}$$

Standard deviation (σ) :

$$\sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

Coefficient of variation according to K. Pearson

$$\sigma * 100 / \mu$$

First interval

$$\mu \pm \sigma$$

Range – percentage of the values which falls into the first interval.

How to use the programme

Install and Uninstall

PaleoTax/Measure no longer forms a part of the Hdb2Win/PaleoTax database package; it comes in a separate package. The separate version is more frequently updated, whereas the package version is only updated when the whole package makes a step to a new version. Download the installation file from <https://www.paleotax.de/measure> and run the installation programme (pm180xx.exe). You probably should have administrator rights to do so. To remove the programme from your PC use the functionality of the operating system (Start / Control / Programs) uninstalling “PMeasure 1.8 (only uninstall)”. The un-installation programme is also installed in the programme folder; you may find it in Start / All programs / PMeasure18. You may keep older versions; you do not need to remove them before installation of version 1.7. Your data and settings will not be affected by removing any older version of the programme from the computer.

Get started

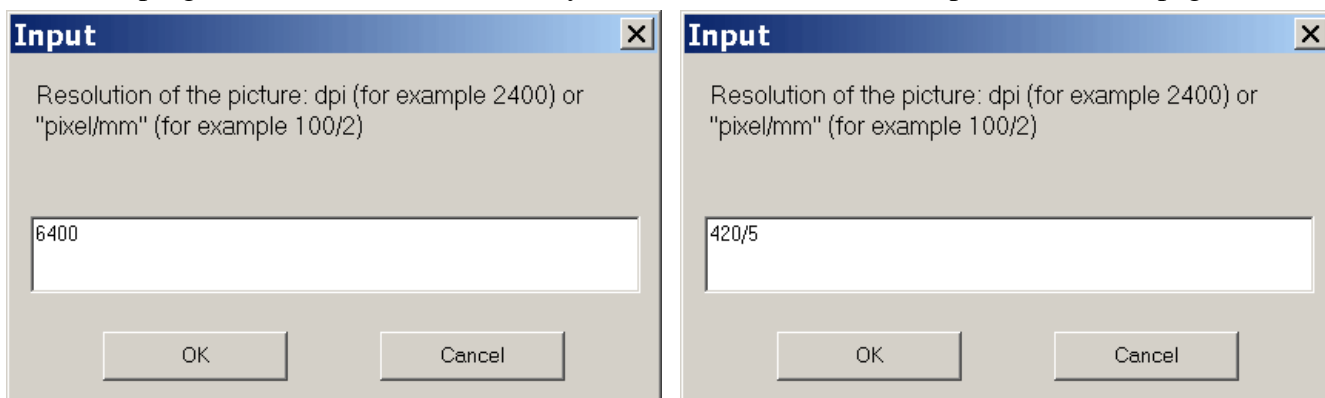
PM requires a screen resolution of at least 600x800 pixels but it is very probably that this value will be increased in a future version. During starting the following errors may occur:

- (1) Unit HSystem Errors can not be started. Memory error.
- (2) Unit HSystem Messages can not be started. This happens when the system error (HSYSTEM.ERR) file could not be read.
- (3) The screen resolution is too low.
- (4) The system message file (HDB2WIN2.MSG) could not be read.
- (5) The application message (PMEASURE.MSG) file could not be read.
- (6) The application error file (PMEASURE.ERR) could not be read.
- (7) The system message file for your specific language could not be read.
- (8) The application message file for your specific language could not be read.
- (9) The history memory block could not be created.

After having PM successfully started, you will see a menu, a tool bar, the working area, a bottom status bar and – on the right hand side – two tables (the upper for the values, the lower for the results). The

language is, by default, set to English and if it is for any reason (perhaps, because of an older installation) in German and you want to change it, choose “Optionen”, and select the English language under “Sprache”. You do not need to restart PaleoTax/Measure. Configuration files are kept in c:\Users\\AppData\Roaming\Hdb2Win\ (Windows from version 7 on) or C:\Documents and settings\\AppData\Hdb2Win\ (Windows XP).

To start to measure, open the file menu, choose “New” (or press Ctrl-N, or click on the symbol in the tool bar) and select a bitmap file (JPG, BMP, GIF). You can also load a vector file (WMF) but it is questionable for which reason. You will be asked to enter the resolution of the image. The resolution is the value you choose in your scanner when scanning the object/thin section/peel, etc. If you have not scanned the object yourself, it should have at least a scale bar scanned with the object. The same applies when your bitmap comes from a digital camera. To tell PM the resolution, open a programme or viewer to handle bitmap files and measure the size of this scale bar in pixel. Let us assume that the scale bar represents five millimetres and you measured a length of 420 pixel; you should enter the value as “420/5”. But it is also possible to import the bitmap with an approximated resolution, measure the scale bar in the programme and correct in this way the resolution. See the examples on the next pages.



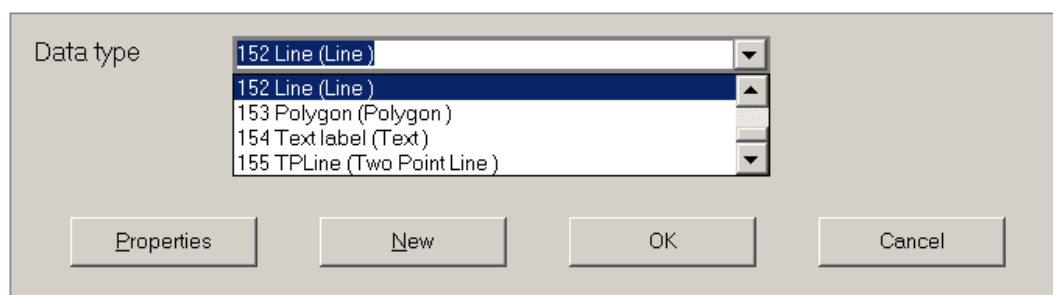
The programme will recognise that you have not entered a resolution and will calculate the correct resolution, automatically. After having chosen a graph file and entering the resolution, the image is displayed in the working area with the correct resolution given in the status bar.



From version 1.5 you can also modify the resolution after having imported the bitmap, even if you have already recorded data. See below for details.

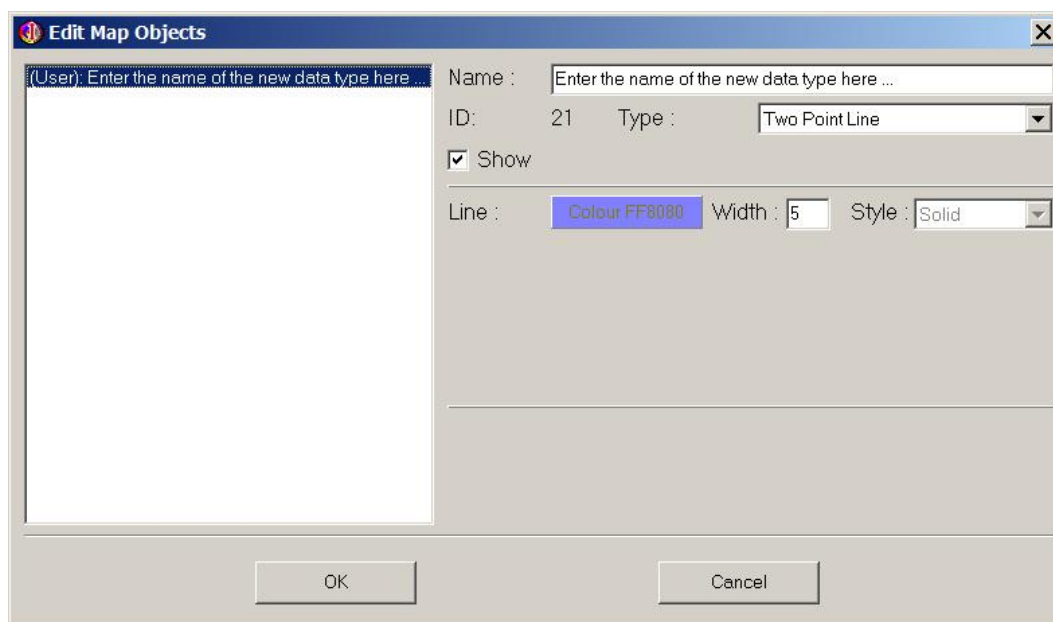
Now you can enlarge or reduce the size of the image, see parts (hold the left mouse button down and draw a rectangle to the lower right) or return to the original size by clicking on the world symbol. With the magnification tool you can reduce (+) or enlarge the size of area, stepwise (-).

To measure values, click on the pin tool. Then click at the first point of the line to be drawn (measure). If you have not chosen before a distance type from the top selection box, just on the right hand side of the tool bar, a menu will open to offer you the standard tools.



By default, there are six different objects types: points (optional with a label), lines with various points, polygons, texts, two point lines and counts. You may use all, but only two point lines (TPLs) and polygons will allow you to measure and calculate values. Texts will be calculated when they represent numerical values. Counts represent a group of points (like a polygon); the amount of points of various group are statistically classified. You can select the available TPL data type 155 or polygon type 153 or count type 156, but it is a better idea to create your own data types. To do so, click on “New”, or choose “Edit / New data type”.

But, before starting, some considerations are recommended. A plane object allows to measure – depending on its shape and characteristics – various types of values. If you have a leaf, you can measure the height and width and some subsequent values, depending on the type of leaf. If you measure a more complicated object like a foraminifer, a crab or a coral, much more values can be obtained (see the example on the next page). It is useful to address each data type with a different (TPL, polygon, count) type (that you may create by clicking on “New”). It is a good idea to first make a list and put the most used data types at the top of the list and to create them first. It easy to create them through the menu item “Edit / New data type”.

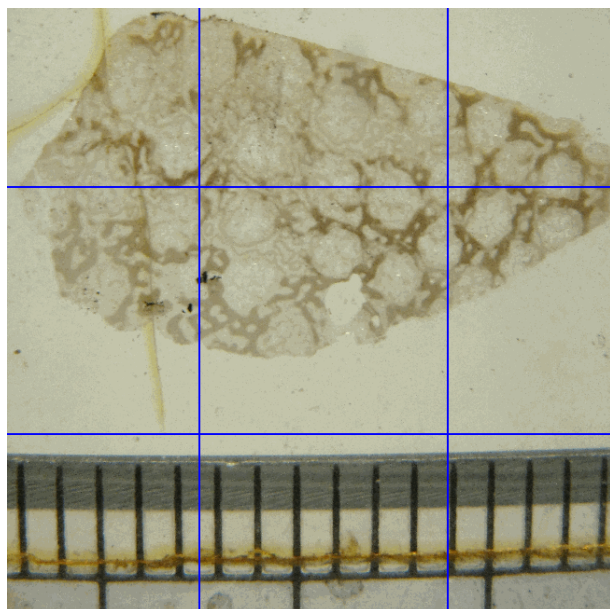


If you create a new data type, the (default) properties of the last used data type are copied into this data type. If there is no formerly created data type, the standard values of the TPLine / polygon are applied (see the figure on the top). Enter a name in the field, preferably in the form “abbreviation (explanation)” and adapt line colour and thickness to your needs. Only if you append a new data type, you may select the object type (line, point, etc.). If you already have a list of data types and you want to edit them, choose the item “Object characteristics” in the Edit menu.

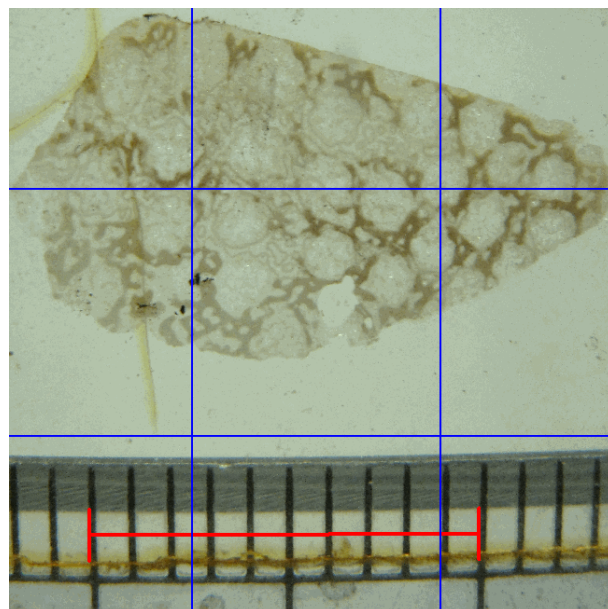
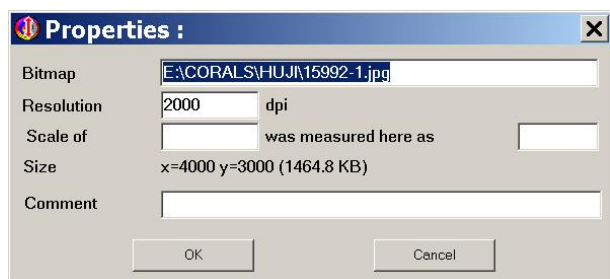
Recalculating the resolution

Let us assume you have a digital image with a scale. PM can help you in defining the resolution of the image. To do so, follow these steps (see the images below):

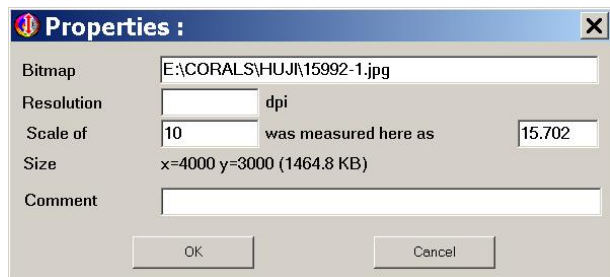
- (1) Open the bitmap with PM and enter an approximate value such as 2000dpi (as in the example below).
- (2) Preferably before recording data, you measure five or ten millimetres of the scale.
- (3) Choose “File / Properties”, and enter the values. In the left field you enter the millimetres of the scale and right field the measured value. Click on “OK”.
- (4) The correct resolution will be calculated. When you have already recorded data, these data will be adapted to the new resolution. So the value of the scale and the measured value should now represent the same value.



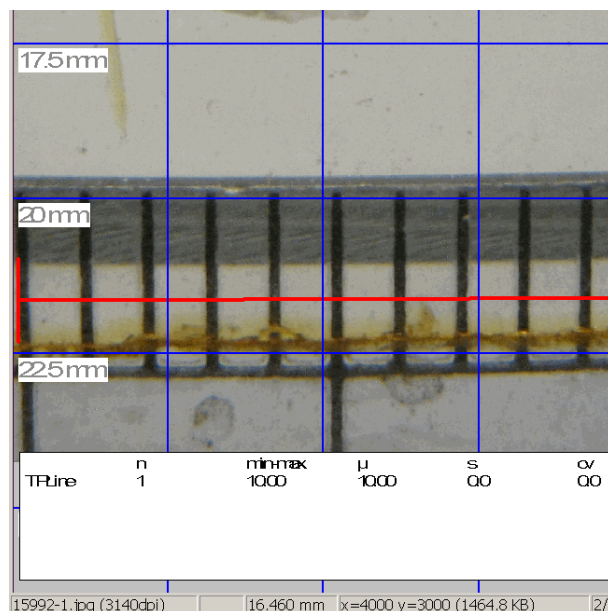
Step 1. Import a bitmap file with a scale.



Step 2. Measure the scale (here 10mm).



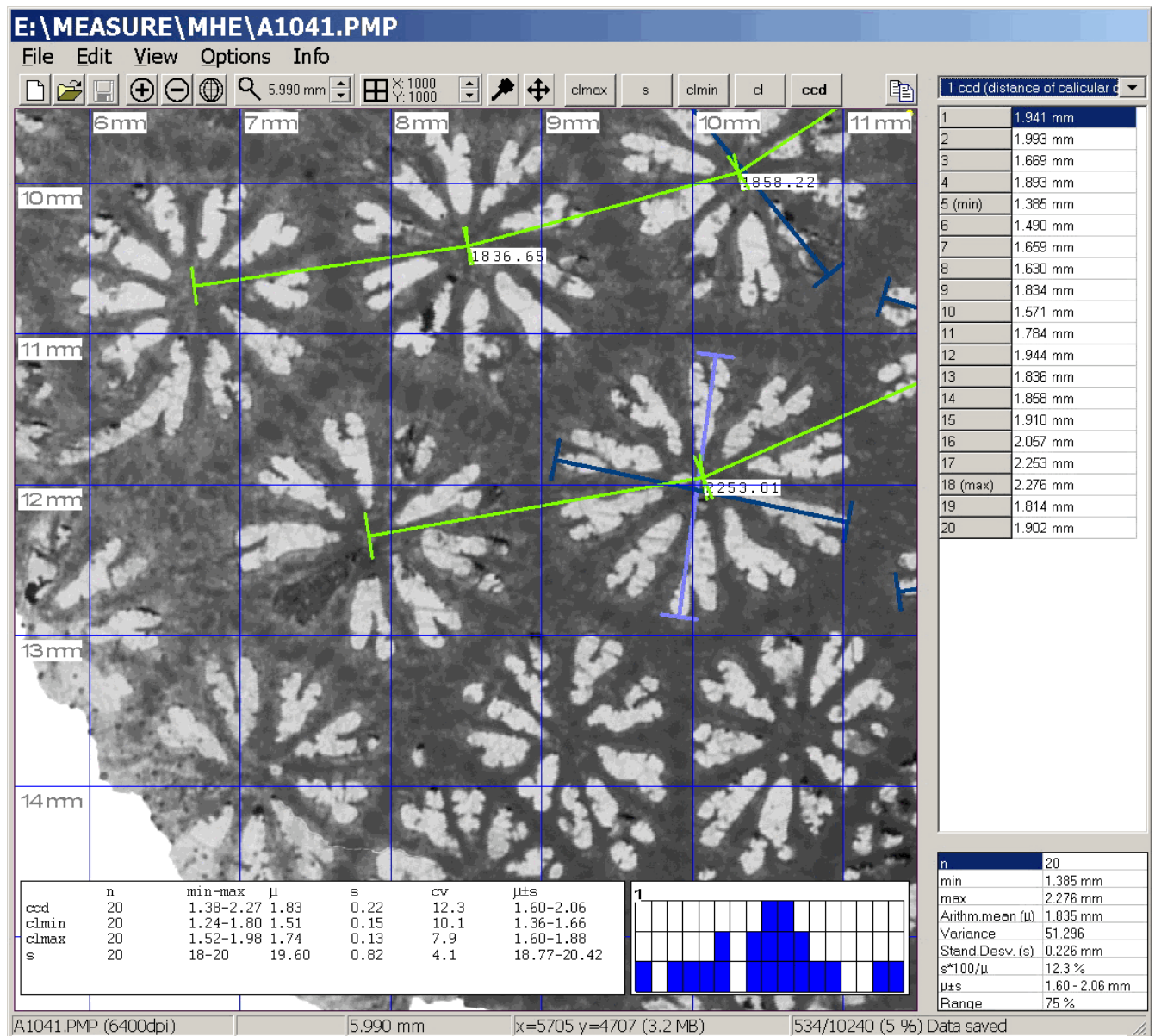
Step 3. Enter this value under “File / Properties”.



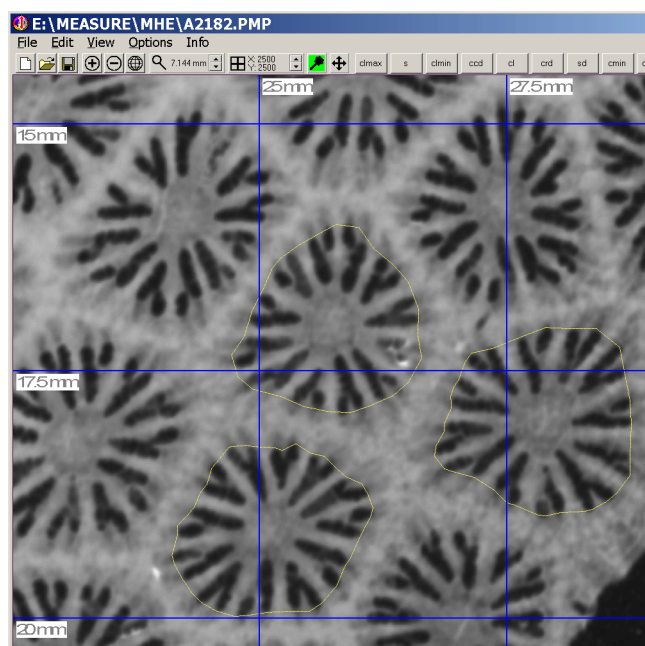
Step 4. The resolution is recalculated.

How to measure

Measuring starts by clicking on the pin symbol and ends by clicking on the pin symbol. If a data type is selected on the head of the table on the right hand side, the pin symbol turns green and you may start. If no data type is selected, a window pops up and forces you to select the data type you want to measure. If you selected a data type by clicking on one of the buttons right-top of the measure area, the measure mode only starts immediately if the option "Start recording when data type selected by button" is switched on in the options.



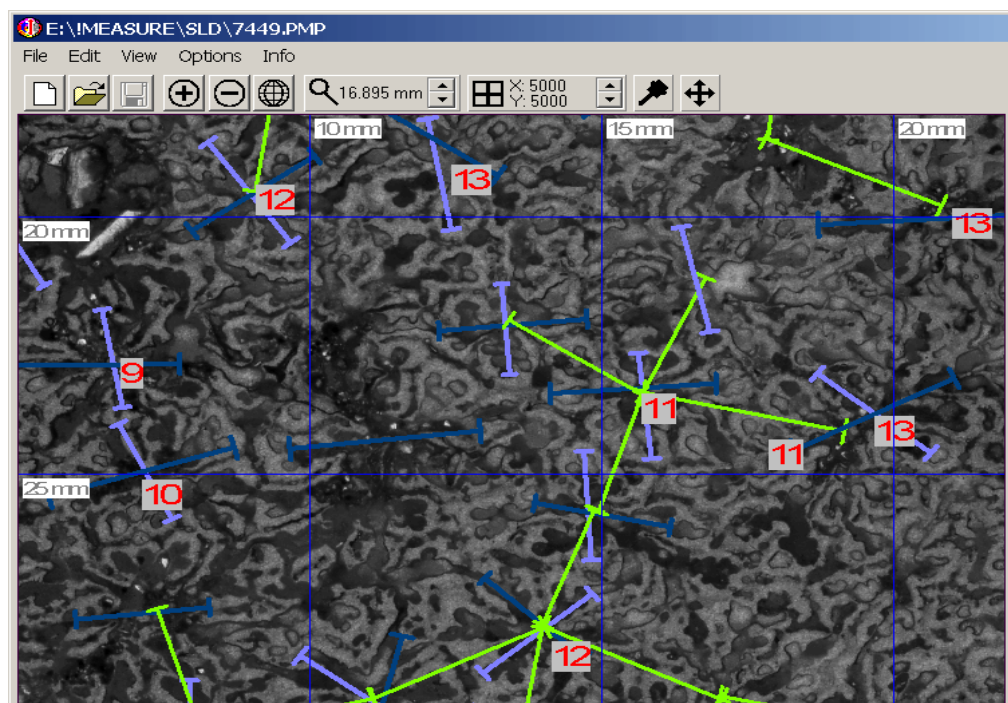
Two point line. – Two points always define a two point line. You may continuously measure.



Polygon. – Polygons consist of a group of points that limit an area. Click on the pin tool to start. Mark your polygon by clicking on the limits. Click again on the pin tool to close the polygon. Start with a new polygon or click again on the pin tool to stop measuring this data type.



Count. – Count consists of polygons of a group of points without showing the area they delimit. Click on the pin tool to start and click again on the pin tool to finish with this group. Start with a new group or click again on the pin tool to stop measuring this data type. The result of counting one group is shown in the centre of the group of points.



Text. - If counting by clicking is not fast enough, you may just count, select the text type, click somewhere in your image and enter the numerical value in the text field. The programme recognises the numerical value and processes the data.

How to edit data

Single values can be easily deleted by double clicking in the table of the values. There appear in brackets and are not included in the calculation. On the screen they are shown in grey (the colour can be modified in the options). Another double-click recall them. The status of being deleted is saved from version 1.5 on.

When clicking on the Modify tool (tool bar, most right tool), the following modifications are possible. Clicking left on a point, holding and moving the mouse will move the point.

Right click on a point,

TP Line – The TP line will be completely removed (not deleted, as above explained).

Point – The point will be removed.

Polygon – Only one point of the polygon will be removed.

Text – A right-click in the upper left corner of the label deletes the text.

Count – Only one point of the count object will be removed.

Holding ALT and clicking left on a point duplicates the point. This works only for Count objects. After duplicating a point it makes sense to move the newly created point. To doing so with the first or last point of a group will display an error code (1 or 2). Error code 3 will reported when the data table is full or the selected point cannot be assigned to any existing group.

Systematic description

Menus

File menu

New (^N) – New project. Selection of an image file (JPG, BMP) and entering a resolution.

Open (^O) – Opens an existing (PMP, PaleoTax Measure Project) file. This file contains (in the ASCII format) the path and name of the image, its resolution, and already recorded data. If the image file is not found, you may select it manually.

Save (^S) – Saves the current project. If no name has been so far assigned to the project, you have to choose the path and to enter the file name. Please note, that the image is not saved in the project file, just its position on your hard disk is saved. So do not remove the image file.

Save as – Saves the current project under a different or new name.

Export – Offers various options.

WMF Windows MetaFile.

BMP Bitmap.

JPG JPG.

Text Exports the values as an ANSI file, which can be imported into any spreadsheet application. It classifies values according the value Options / Display / Bin size. The unit of the bin size is always μm . It is recommended to set the bin size to a fixed value when exporting data!

Screen Summarises the calculated values for all measured types in the form of a short report without giving the detailed data. You may choose the values you need in Options / Export / Output “Screen”.

PaleoGraph Writes a PGR file of selected values which can be displayed in PaleoTax/Graph. Bin size as above. The characteristics can be selected.

R Exports the values as an ANSI file, which can be imported into the statistic programme R. The characteristics can be selected.

Properties – Gives information about the current project and allows to modify the resolution of the image. From version 1.5 you can modify the resolution after having imported the bitmap, and even after having recorded data.

Reset (^R) – Closes the current project. You are asked if you want to save the current project if it is not saved.

Exit (ALT+X) – Closes the programme.

Edit menu

Measure – Start to measure.

Modify – Start to modify measured values.

Object characteristics – Offers the possibility to modify colour, line length etc. of the various data types.

New data type – Appends a new data type.

View menu

Refresh – Refreshes the display. Space key makes the same.

All – Shows the whole image.

Reduce – Reduces the size of the image. The percentage value can be modified in the options.

Enlarge – Enlarges the size of the image. The percentage value can be modified in the options.

Options menu

Data/System

Data path – Path for the PaleoTax Measure Project files.

Object file – Name of the file which contains the description of objects.

Bitmap folder – Name of the current image folder.

Pool folder (Images) – This is a folder name where the programme may search for images if they are not found in the original folder.

Image drive – Pool drive where the programme may search for images if they are not found in the original drive.

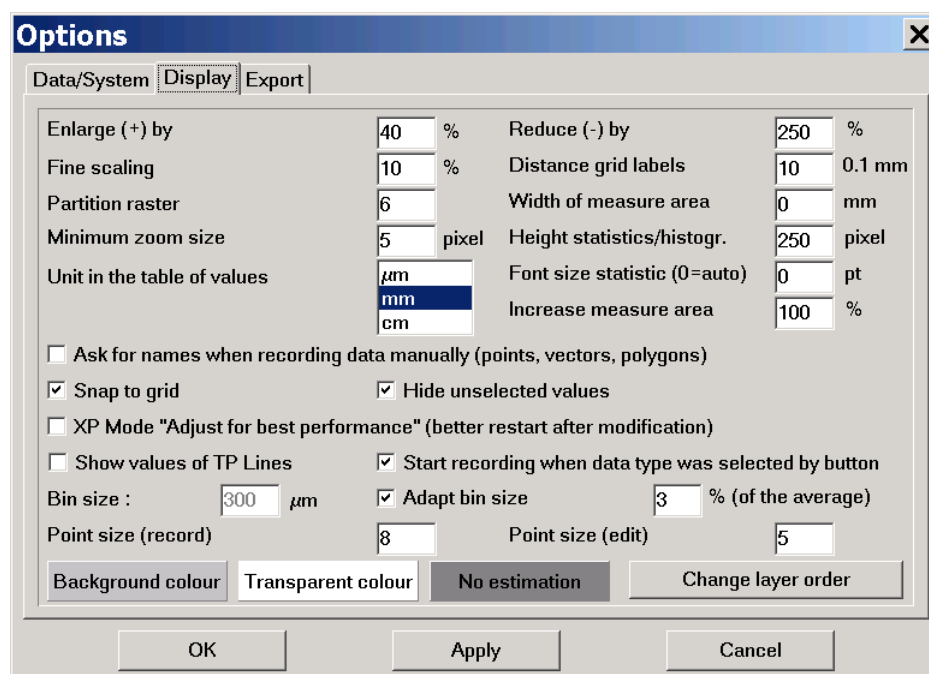
Language – Language of menus, etc.

User data – Amount of records which can be recorded by the user at the same time.

Display warning errors – If marked, also warning errors are shown (generally, just for testing the software).

Registered for – Registration is currently not necessary.

Display



Enlarge (+) by – Percentage of enlargement when the + key is pressed, the Enlarge command used from the View Menu or clicked in the + tool.

Reduce (-) by – Percentage of reduction when the - key is pressed, the Reduction command used from the View Menu or clicked in the - tool. Enlarge and reduce should be proportional values. This does not mean that they are identical (because, they are percentages). Valid pairs are 80–125 (with a very low rate of enlargement and reduction), 40–250, 20–500 and 10–1000 (with a very high rate of enlargement and reduction).

Fine scaling – Percentage of enlargement or reduction when the up or down arrow is clicked in the magnification tool in the toolbar.

Distance grid labels – Distance of grid labels from the grid lines.

Partition raster – Number of horizontal and vertical grid lines on the working area.

Width of measure area – To obtain a correct scale bar, you should measure the width of the image area (in mm) displayed on your screen and enter here.

Minimum zoom size – The smallest size (in pixel) when a new frame is selected by pressing and holding the left mouse button and drawing the window.

Height statistics/histogr. – Height of the box at the bottom of the draw area that shows the statistics and the histogram. The font size of the statistics is adapted to the height of the box.

Unit of the table of values – Select the unit which should be used in the table and export.

Max font size statistics – Set the font size (in points) for the data box at the bottom of the measure area. Zero (default value) indicates that the font size is calculated based on the available space.

Increase measure area – This percentage value increases the size of the measure area. Under some circumstances the measure area remains smaller than the area envisaged for it. Please increase manually the value stepwise until the measure area has the desired size. You can fix this problem also with a right-click on the programme; selecting "Properties > Compatibility > Change high DPI settings". Mark the box "Disable Display Scaling on High DPI Settings".

Ask for names when recording data manually (points, vectors, polygons) – Asks for names for any point, or point of a line or polygon.

Snap to grid – If marked, the selection of a smaller working area orientates on the grid.

Hide unselected values – During data recording all data which do not belong to the currently recorded type are shown as black thin lines.

XP Mode "Adjust for best performance" (it is better to restart after modification) – If working with the operating system Windows XP and having set the performance to "Adjust for best performance" this option should be switched on, because it makes a more optimal use of the screen. It is better to restart the programme after switching on or off this option.

Show values of TP Lines – Displays the numerical value of TP lines. Only values of the selected data type are shown.

Start recording when data type was selected by button – The recording mode is automatically switched on when a data type is selected from the line of buttons top-right (from 1.6 on).

Bin size – Size of the bin when exporting data as text files and showing as histogram in the display. The unit is always μm . Bin size should be approximately 3% of the average of the measured values. If, for instance, the average of your values is 2 mm, the approximate bin size should be 60 μm . It is possible to calculate the bin size always on the base of a given percentage of the average (see below). - Switch the layer (9) on to see how values are distributed.

Adapt bin size – If switched on, the bin size will be calculate as a percentage of the average. Calculation will be made after any change of values.

% of the average – Enter here the percentage of the average for calculation the bin size. Value must be between 1 and 99.

Point size (record) – Size of the point in pixel when data are recorded.

Point size (edit) – Size of the point in pixel when data are edited.

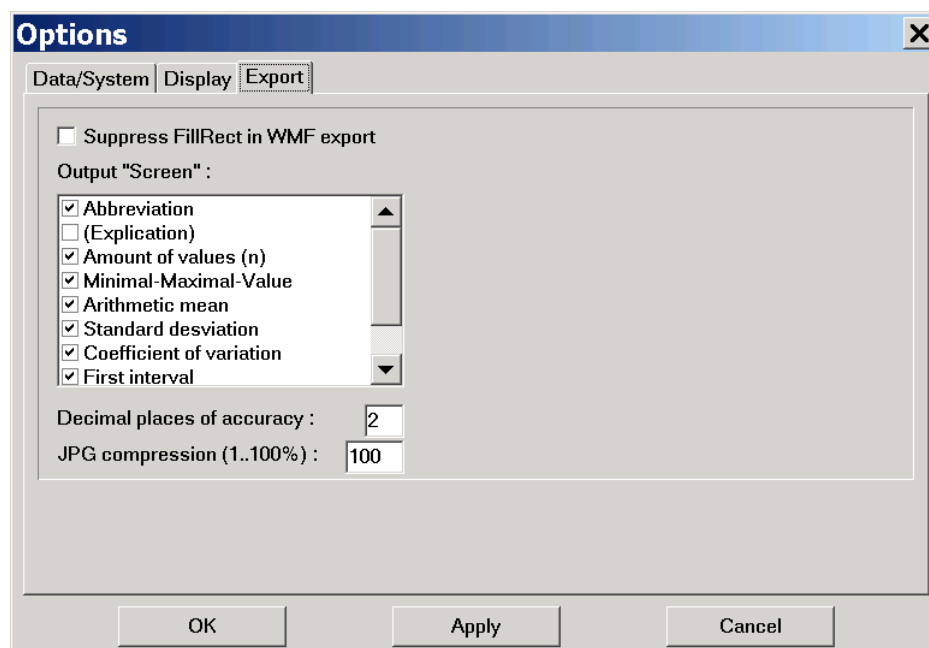
Background colour – Background colour of the working area.

Transparent colour – Colour in images to be transparent, say, any pixel with this colour in the imported image will show the background colour.

Deleted objects – Colour of deleted objects.

Change layer order – Modifies the order of the different layers in the working area. You do not need to change that, but if you like, you may switch off the boxes at the bottom of the working area ("(9) Histogram" and "(10) Statistics"). If both are switched on, layer 10 should be the last item in the list.

Export



Suppress FillRect in WMF export – Only valid for the export to the WMF format to avoid problems when importing the WMF file into vector oriented drawing programmes.

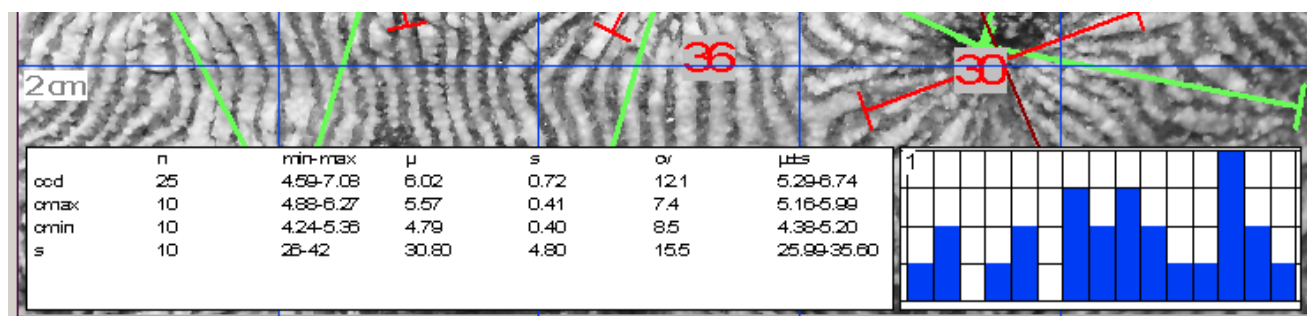
Output “Screen” – List of values which are shown in the Screen output mode.

Decimal places of accuracy – Number of decimals that will be shown in the screen output.

JPG compression (1..100%) – JPG quality when exporting. One is lowest quality, 100 highest quality.

Working area

The working area is always quadratic, e.g. height and width have the same size (this makes calculation much easier). There is a grid in which density of the grid lines can be controlled by the user. In the left lower corner is a small scale which only works if you enter the size of the working area in mm on your screen. To do so, you should start the programme, adapt its size to your needs or the screen size, take a ruler and measure the value of the area. The value (mm) you enter in the options (Width of measure area). If the value is 0 (by default), no scale will be displayed. If layer (9) is switched on, in the lower right corner a diagram is displayed which shows the distribution of the measured values. Bin size according to the value defined in the options. If layer (10) is switched on, in the lower middle area a overview for all recorded data is shown. Shown values according to Options / Export / Output Screen.



Layers (9) and (10) are, by default, not active. They can be activated in Options / Display / Change Layer Order. Layer (9) should be always displayed before layer (10), because otherwise the latter layer is shown incompletely.

Toolbar

New, Open and Save – Self explaining.

Plus tool – Enlarges the size of the image. The percentage value can be modified in the options.

Minus tool – Reduces the size of the image. The percentage value can be modified in the options.

World tool – Shows the whole image.

Magnification tool – Enlarges or reduce the size of the image in small steps. The percentage value can be modified in the options.

Grid tool – Increments or decrements the number of grid lines.

Pin tool – Activate to record data. Close a polygon or a group of points. Deactivate data recording.

Move tool – Activate to modify the position of points. When activated, points can be moved, or (right-click) deleted.

Status bar

Field 1 – Name of the project (or image) and its resolution.

Field 2 – Factor of magnification (do not forget to enter the screen size in the options!).

Field 3 – Width of the image area in mm.

Field 4 – Size of the image in pixels (size in KB/MB).

Field 5 – Amount of recorded data, percentage of used space and status of being saved or not.

Tables***Top selection box***

Here you can select the type of values you will take before selecting the pin-tool. Values of this type will be displayed in the tables. The selection is not possible if you are recording or editing data. On its left hand side is a copy symbol that copies the data of the table into the clip board. From here it can be easily imported in other programmes such as XL or PAST.

Values (upper) table

The table lists the values of a selected measure type (and only for this type!). Double click in a cell to remove values from the table. Be sure that you have chosen the correct cell. You have to click in the field of the value, not in that of the current number. Smallest and highest values are marked.

Results (lower) table

The following results are given:

n – Number of measured values.

min – Minimal value. max – Maximal value.

Arithm.mean – Arithmetic mean (μ) on the recorded values.

Variance – Variance of the recorded values.

Stand.Desv. – Standard deviation (σ) of all the recorded values.

$s*100/\mu$ – Coefficient of variance according to K. PEARSON.

$\mu \pm s$ – The amount (in percent) of measurements which falls into the (first) interval $\mu \pm \sigma$, which gives a first idea about the distribution of data.

Range – Amount of measurements which fall into the interval $\mu - \sigma$ and $\mu + \sigma$.

Problems and limitations

PM under virtual environments

When PM is running under a virtual environment (e.g. under a Windows installed as a guest system on a Unix or Mac OS operation system as a host using a virtual machine) and tries to read a large image from a shared folder of the host system, a timeout error may occur ("Cannot read file"). The easiest way to bypass this error is to make a local copy of the image file. To force PM to do so, you need to edit the configuration file (Pmeasure.cfg) manually (location is c:\Users\<username>\AppData\Roaming\Hdb2Win\ for Windows 7 and younger or C:\Documents and settings\<username>\AppData\Hdb2Win\ for older Windows versions). Open the file with a plain text editor (such as Notepad.exe) and search line 26:

```
; Data.CopyImage  
26      0
```

Change the value from 0 to 10. This value gives the size of the image file in MB from which the file is copied into the root directory of your (virtual) hard disk C:\. If there still occur errors, reduce the value to 5. Zero indicates that the file is never copied to the local drive (default setting).

The same problem occurred when image files are loaded from an external disc drive. In this case, please apply the same procedure.

Polygons

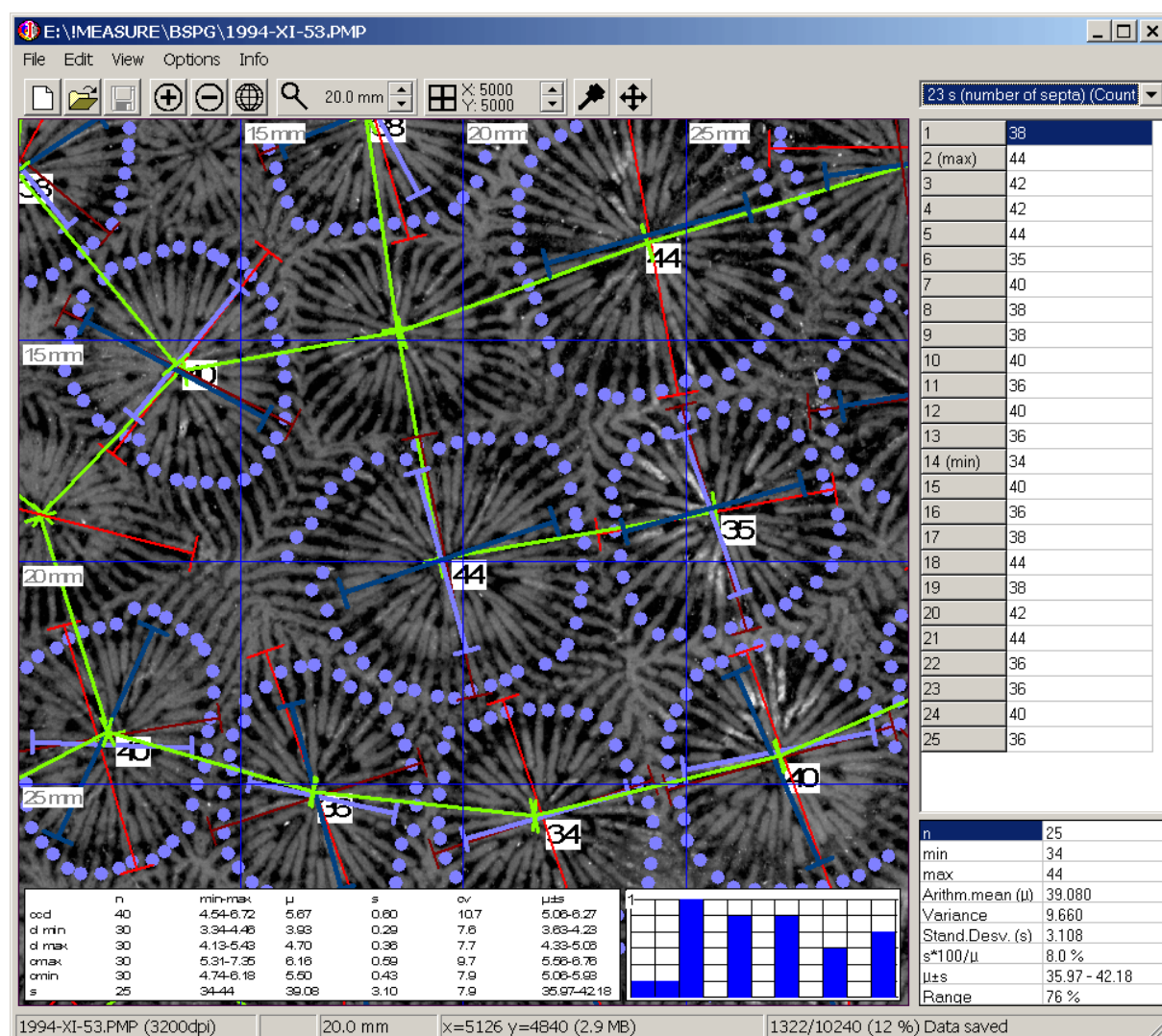
It is possible to capture any type of polygon, but keep in mind that the calculation of the polygon area is based on Surveyor's Formula which allows only simple, e.g. non-self-intersecting polygons. A polygon must have at least three points.

Display size

As mentioned at the beginning, PM still support very small screens down to 600x800 pixels. Version 1.8 will be the last version supporting this size. – The programme is still developed under Windows XP. Under newer versions of the operation systems, user reported the problem that the measure area is smaller than the area provided for it, and also incorrect values of measured distances. This is related to UHD displays. On screens with a comparably high resolution, Hdb2Win offers only very low screen resolutions for the data acquisition forms. This is because the operating system "pretends" a small screen to be compatible with all programmes. You can fix this with a right-click on the programme; selecting "Properties > Compatibility > Change high DPI settings". Mark the box "Disable Display Scaling on High DPI Settings".

Miscellaneous

Please note that for programme version 1.6 a manual in the German language is available. Make proposals concerning what else would be interesting for you. Give equations; function(s) can easily be incorporated. See the image on the next page, a typical picture – here, the various diameters of corallites, the distance of corallites and the number of septa in a fossil colonial coral.



Copyright information

The right to use the programme freely without paying any fee does not imply that the programme is without copyright. If you use the programme in your research and you will mention its application in the method section of your publication(s), please refer to it in the following way

“PaleoTax/Measure 1.8 (<https://www.paleotax.de/measure>, © Hannes Löser)”

The programme has been developed within the framework of my duties as researcher and lecturer at the Universidad Nacional Autónoma de México (UNAM) and my university has the right to ask for references to products of faculty members. I would be grateful for receiving PDF files of your publications where PaleoTax/Measure is mentioned. I am grateful to Enrique Jesús Velázquez-Heras for the translation of messages into the Spanish language.

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