Mountains 9

Release Notes

Version	Date
9.0.9653	June 6th 2021
9.0.9677	June 30th 2021
9.0.9733	August 25th 2021

Digital Surf Software Updates

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What's new

	Contour analysis study: intersection points, multiple intersection points
New Intersection point: between arc of ellipse, circle, arc of a circle and profile	It is now possible to create an intersection point between an arc of ellipse, a circle, or an arc of a circle and the profile in addition to the segment in the Contour analysis study on Profile and Parametric profile studiables. A dialog box now allows the user to choose an intersection criterion. The Create Profile Point menu has been reorganized into 3 columns for better visibility.
New option: multiple intersection points with profiles.	It is now possible to create multiple intersection points between an element (segment, arc of ellipse, circle, arc of circle) and the profile in the Contour analysis study on Profile and Parametric profile studiables while choosing an intersection criterion.
	Particle analysis study: new segmentation methods
New Segmentation by the Dominant Channel in Particle analysis study	A new "Segmentation by the Dominant Channel" method in the Particle analysis study has been added for Multi-channel image studiables. It allows the definition of particles of a predominant material at each point on the different channels (chemical maps) of the Multi-channel image.
New Object-oriented segmentation (SEM-SE) in Particle analysis study	A new "Object-oriented segmentation (SEM-SE)" method has been added in the Particle analysis study. This method is useful for SE images from SEM instruments. It can be applied on images and improves particle detection using segmentation tools already present in the Image colorization study.
	Cloud: Mesh operator
New "Mesh the point cloud" operator	The new "Mesh the point cloud" operator on Cloud studiables allows the reconstruction of the shell surface.
	Parameters table on Cloud and Shell: new parameters
New basic parameters on Cloud and Shell studiables	A new set of parameters on Cloud and Shell studiables has been added. Basic parameters (center position, standard deviation in X,Y,Z) can be calculated.
Surface texture parameters on low-pass filter Shell	Calculations of height, volume and hybrid parameters are now available from a filtered shell reference (Gaussian-like or bilateral filter) in the Parameter study on a Shell studiable.
	Other features
Multi-Channel Image creation from several MCIs	The Add/remove channel image operator is now available to create a Multichannel image studiable from several Multi-channel images studiables.
Improved handling of loading many studiables	Mountains has changed its behavior when loading multiple studiables: if more than 25 files are loaded, default studies are not created anymore in the documents. Instead, studiables are simply loaded into the workflow to decrease loading time and simplify the document. It is then possible to create a Series, or to apply operators or studies in batch.
Saving and exporting format OBJ and PLY added for Surface and Surface + image	It is now possible to save or export Surface and Surface + image studiables in OBJ et PLY formats.
German, French, and Japanese Reference Guide	The online "Reference guide", accessible when pressing F1, is now available in German, French, and Japanese languages.

Bug corrections (A and B type)

	Type	Bug Description
MNT-3253	A	The Volume parameters study on a Surface studiable is not updated after a studiable substitution. The software may then crash when closing the dialog box of the Axis settings in the top ribbon button if called on the Volume parameters study.
MNT-3411	A	The calculation of profile parameters may be erroneous if the 1/2 cutoff from each side option is selected and the profile contains unmeasured points.
MNT-2165	B	The positions of the exclusion zones in the Summary of current operator study are not correctly managed for the Subtract profiles operator.
MNT-3071	B	The vertical axis is not updated in the Volume parameters study on Surface studiables when applying a filter and defining a cut-off to remove.
MNT-3246	B	The Relative/Absolute option of the Z Axis settings in the General Preferences of the software on Multi-channel image studiables is not taken into account in the Particles analysis study.
MNT-3247	B	The value of the Frequency (in points) parameter in the Histogram study on Multi-channel image studiables is incorrectly calculated if the selected layer is changed.
MNT-3258	B	Editable fields in the Extract area operator dialog box do not affect the position of the dotted lines as shown in the preview of the area to be extracted if the rectangle shape is selected. Affects Surface, Series of surfaces, Multi-channel image, Multi-channel cube, Image, Series of images, Surface + image and Hyperspectral image studiables.
MNT-3270	B	The ratio values of the Z-axis are modified when recalling the Edit axes operator or when reloading the document after an Undo / Redo action on a Multi-channel image studiable and then saving the document.
MNT-3273	B	Non-measured points and black images are created on Multi-channel image studiables after a studiable substitution if the units of the channels are not of the same family or when Undoing an action after a substitution of this type. The operator is not applied on all channels and a warning appears in the workflow.
MNT-3304	B	The identity of a Range can be duplicated in the Particles analysis study on Multi-channel image studiables if the Multiple threshold option is selected and ranges are added and deleted several times.
MNT-3308	B	The value of the "Equivalent diameter of grains volume standard deviation" parameter in the 'Multi-channel cube' analysis on a Multi-channel cube studiable is incorrect.
MNT-3309	B	The Chinese translation for "Contour analysis" is wrong.
MNT-3310	B	The Parameters table study is not calculated on a Multi-channel image studiable if the first channel is an image.
MNT-3319	B	The Parameters table is not updated on Multi-channel image studiables after a studiable substitution if the first channel is an image.
MNT-3330	B	Saved settings are not applied in the Particle analysis study on Image or Multi-channel Image studiables if the "Multiple threshold" option has been selected in the top ribbon.
MNT-3341	B	Classification of particles is not created in the Particles analysis study on Multi-channel image studiables when the dialog box is first opened if the Multiple threshold option is selected in the top ribbon.
MNT-3348	B	The Z offset of the result of the '3D reconstruction using multifocus images' operator on a Series of a Series of Images studiable is wrong.
MNT-3351	B	The T-axis of the series option on Series of images studiables is not correctly taken into account when applying the Multifocus reconstruction operator.
MNT-3397	B	It is not possible to extract an average profile when applying the Extract profile operator on a Multi-channel image studiable if it contains an image layer having different dimensions to those of the surface layers.
MNT-3398	B	The Force "Adhesion" or "Snap-in" values may be inverted in Force curve analysis studies when activating the WLC model for analysis and then deactivating it.

MNT-3414	B	Operators can be locked in the workflow if an operator is applied twice, and all frames are subsequently deleted in the document then in the workflow followed by an Undo action.
MNT-3418	B	Saving the channels of a Multi-channel image studiable in several files may not work in some specific cases.

To be completed.

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What's new

	ISO-21920
Default ISO 21920 in parameters study	ISO 21920 parameters are now set as default 2D parameters in Parameters table study on profile and series of profiles (ISO 21920 - Roughness (S-L) Height parameters: Rq, Rsk, Rku, Rz, Ra).
	Cloud studiable
Example studiables: Cloud studiable	A new Cloud studiable has been added to the available example studiables.
	Force curves style and visibility
Force curves: separate buttons for style and visibility	There are now separate buttons in the 'Force curve' analysis ribbon for the style and the visibility of each phase in the Force curve studies.

Bug corrections (A and B type)

	Type	Bug Description
MNT-370	A	The software may crash after loading a document containing a duplicated ActiveX addon.
MNT-2470	A	Mountains may crash when loading a very large series of spectra.
MNT-3075	A	A crash can occur in a Step height study on a Profile or a Series of profiles studiables if the "ISO 5436-1 A2 method" is chosen and if the profile contains only a few points.

MNT-3103	A	The result of the "Remove multi-plane form operator" on a Surface + image studiable is erroneous.
MNT-3120	A	Network licences are not correctly detected in version 9 if the license is originally for V8, even if the Software Maintenance Plan (SMP) is active.
MNT-3126	A	The non-measured points on Profile studiables are not taken into account in the Parameters table study when the F-operator is configured to minimum zone leveling.
MNT-3152	A	The software may crash when double-clicking in the Box Plot or Scatter plot study from a Particle analysis study with classification.
MNT-3176	A	A crash can occur when opening the Curve style dialog box on a Force curve studiable if clicking on an empty item in the Data group.
MNT-3177	A	The calculation studiable in a Parameters table study on Profile studiables can be generated twice if the factory settings are applied after generation. Deleting the associated Parameters table study can cause the software to crash.
MNT-3188	A	Volume parameters calculated in the "Volume parameters" study on Surface studiables are erroneous when the studiables are filtered.
MNT-3205	A	The software may crash when applying a template on several Multi-channel image studiables if the template was created in v8.
MNT-3209	A	The software may crash when the document is substituted if a non-compatible studiable is selected and the action is canceled when the error message is displayed.
MNT-3225	A	A crash may occur in the Parameters table study on Shell studiables, which depends on the type of form removal in use when the Height parameters are selected.
MNT-3231	A	The software may crash when loading a file in PLY format.
MNT-3019	B	The Length of the profile extracted by applying the Extract profile operator on a Multilayer surface studiable is incorrect.
MNT-3060	B	The Z-axis settings options “Setting by type of channel” and “Setting by Channel” on Multi-channel image studiables are not set to the correct default value in the Particles analysis study.
MNT-3063	B	The "Comparison slider" rendering mode on a Multi-channel image studiable generated by the application of the "Generate whole content' button in the Colocalization study is incorrect when the layers of the studiable do not have the same dimensions (resolution, size, offsets).
MNT-3067	B	The Z offset of a channel in a Multi-channel image studiable may be lost when saving in SUR format.
MNT-3078	B	The Results table created by the Result calculator is sometimes hidden until a new page is added to the document if the pages in the document are almost completely full.
MNT-3080	B	The result of the Stitching operator is different in V9 if a document containing this operator on a Multilayer surface studiable is created in V8.
MNT-3081	B	The loading of a document created in version 8 containing the Edit axis operator applied to a Multilayer surface studiable is incorrect.
MNT-3102	B	The preview in the dialog box of the "Apply lateral corrections" operator applied to a Multi-channel image studiable does not match the operator's result displayed in the workflow.
MNT-3104	B	The dialog box of the Remove multi-plane form operator applied to a Multi-channel image studiable can not be validated if a non-topographic channel is selected.
MNT-3131	B	Non-measured points are not filled in on Multi-channel image studiables if the "Show the operator dialog" option is selected as the loading action in the General preferences of the software and then a studiable containing non-measured points is loaded with the management set to fill the points.
MNT-3154	B	The display of the graph in the Volume parameters study is not modified if "Imposed range" option is chosen for vertical axis (Z) in the Axis settings dialog box and if absolute coordinates are used.
MNT-3168-	B	The X-offset of the profiles extracted in a south-north direction could be wrong depending on the unit of the X-axis.
MNT-3174	B	The application of the Mirror operator on Multi-channel images studiables may change the axes units defined in the General preferences of the software.

MNT-3189	B	The choice to deselect the Use X/Y offsets option in the Add/remove channels operator dialog box on Multi-channel image studiables is lost when applying the Undo / Redo button.
MNT-3196	B	Excluded frequencies in the Filter spectrum operator are incorrect on Profile studiables.
MNT-3207	B	The result of the "Correct the shell" operator is erroneous if one of the Smoothing options is selected in the dialog box and the document is reloaded.
MNT-3208	B	The Z-offset between surfaces in the Stitching operator on Surface studiables is not correctly taken into account.
MNT-3215	B	Some icons are missing in the ribbons if Mountains is used as ActiveX from an executable file which is not stored in the same folder as Mountains and the color theme is not the default one.
MNT-3219	B	The "Extract slices" operator on IV curves studiables is not available in the top ribbon.
MNT-3224	B	In products that contain chemical cubes but not series of images, it is not possible to load chemical cubes from a multiple selection of images.
MNT-3226	B	The Young's modulus is not calculated on Force curve studiables if the Conical or Pyramidal models are chosen in the Indentation configuration dialog box.

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What's new

	Useful for all users:
	Histogram and Abbott curves study enhancements
New [Histogram] button	A new [Histogram] button has been added beside the [Abbott curve] button in the Studies ribbon. The two buttons display the same Histogram/Abbott curve study but give direct access to different settings. The [Histogram] displays vertical bins, an automatic number of bins and a unit in number of points for the 'Frequency' axis (default settings). The Histogram button is available for Profile, Series of profiles, Surface, Series of surfaces, Surface + image and Multichannel image studiables.
Interactive mode for Multi-channel image in Histogram/Abbott curve study	The Interactive mode for Histogram/Abbott curves is now available on Multi-channel image studiables in Histogram/Abbott curve study.
Automatic detection of the 2 main peaks in Histogram/Abbott curve study	A new Two peaks detection method has been added, to automatically place the cursors on the histogram's 2 highest peaks, in the interactive mode of Histogram/Abbott curve study.

Number of points unit in Histogram/Abbott curve study	You can now choose Number of points as the frequency axis unit (instead of %) on histograms of Histogram/Abbott curve study.
Zoom on Histogram/Abbott curve study	You can zoom with the mouse wheel (or with a selection rectangle) in the Histogram/Abbott curve study.
New parameters in Histogram/Abbott curve study	New parameters are shown in the list of parameters below the histogram: Frequency in number of points, Frequency in %, and Number of points between cursors. Some parameters have been renamed. These are displayed by groups and in columns for a better visualization.
Automatic bin number in Histogram/Abbott curve study	You can choose the automatic mode to define the number of bins in the histogram of Histogram/Abbott curve study. The automatic mode calculates the number of bins as the square root of the number of points of the studiable.
Rounded graduation figures in Histogram/Abbott curve study	Graduation on the Z values axis now displays rounded figures, in Histogram/Abbott curve study.
Continuous density curve improved in Histogram/Abbott curve study	The visualization of bins in Continuous density curve mode (which depends on the number of bins displayed on the screen) has been improved in Histogram/Abbott curve study.
Increased maximum bins in Histogram/Abbott curve study	The maximum number of displayed bins is increased to 10 000 in Histogram/Abbott curve study.
Axis names in Histogram/Abbott curve study	Axis names are added (Frequency for Histogram, and Bearing ratio for Abbott curve) in Histogram/Abbott curve study.
Ergonomics of interactive mode in Histogram/Abbott curve study	The ergonomics of the interactive mode have been improved for Histogram/Abbott curve study. The cursor points are displayed on the Abbott curve, and an arrow has been added on the histogram bin where the cursor is located.
Added columns in text file Export in Histogram/Abbott curve study	When the user exports the histogram of the Histogram/Abbott curve study in text format, the titles of the columns correspond to the data: Heights, Frequency or Number of points (%). The button to export the histogram in the Histogram/Abbott curve study has been renamed [Export histogram].
	## New Result calculator
New Result calculator	It is now possible to perform mathematical operations on numerical result values (eg Sa / Sz). A new [Result calculator] button has been added in the Results ribbon, and the result is displayed in the document in a Table of results. The Result calculator is visualized in the Result manager panel and can be recalled from the Table of results or from the Results manager. Conditional functions can be used in the formulae. The Results calculator can also be used to customize the name of a parameter.
	## Improved automatic structure exclusion in leveling
Fine tuning of automatic structure exclusion in Level and form removal operators	Structure detection has been improved in the Level, and Remove form operators. Two sliders (Above, Below) have been added to increase or decrease the value of the automatically calculated thresholds (thus increasing or decreasing the number of points excluded from the plane or form calculation). A reset button allows the automatic threshold values to be reset.
Structure exclusion using histogram or references, in Level and Form removal operators	The structure detection threshold can be fine-tuned using the histogram (frequency distribution), in the Level and Remove form operators. The user can open an interactive sub-dialog that allows them to adjust the exclusion thresholds by moving a bar on the histogram. In this sub-dialog, a new drop-down list offers a choice of reference heights for calculations (Mean plane, Absolute, Bearing height, Lowest point, Highest point). The threshold values are then defined in numerical values for automation.
Real-time preview of Structure exclusion mask in Level and Form removal operators	The user can visualize the preview of the structure exclusion mask in real time in the Level and Remove form operators.
Operators concerned by exclusion improvements	All the improvements listed above on structure exclusion, are included in the Level (Least squares), Level line by line and Remove form operators on Surface, Series of surfaces, Surface-image, and Multichannel image studiables.

	Global statistical analysis and automation
Statistics on documents	All products that host the multi-document interface, now allow you to create statistical documents. You can identify correlations by the calculation of many statistical parameters, and the display of Control chart, Scatter plot, Histogram, Box plots on numerical results coming from several analysis documents.
Generalised automation tools	The ability to use Tolerance limits, use Minidocs, Apply a template on a folder, and Aggregate results coming from different series of results (Series of profiles or particles) is now available on all Mountains products.
Quick operators	All Mountains products now include quick pre-processing, quick extraction and quick assembly operators.
Quick assembly	It is now possible in one click to assemble several studiables as a series, and apply an operator (or a study) from a Multi-selection. A Quick assembly group is available in the Operators (and in the Studies) ribbon.
	New Comparison slider
Comparison slider for Surface+image and Multi-channel images	A new [Comparison slider] button is available for Surface+image and Multi-channel images. It allows the user to view several layers at the same time on portions of the display. The user can display the selected layers with a vertical, or a horizontal movable slider. Palettes are displayed beside the visualization. This slider is included in the Pseudo-color study on Surface+image and Multi-channel image studiables.
	Miscellanous improvements for surface texture analysis
New Volume parameter study on profiles	The Volume parameter study is now available for Profile studiables.
Filter settings in Volume parameter study	Filter settings can be defined in the Volume parameter study for profile and surface studiables.
New parameters for volume calculated on profiles (ISO 21920-2)	Functional parameters for volumes calculated on profiles according to ISO 21920-2 have been added. These include Pvmp, Pvmc, Pvvc, Pvvv and Rvmp, Rvmc, Rvvc, Rvvv.
Sdr method for multiscale analysis	A new method based on the Sdr parameter has been added in the Scale sensitive fractal analysis study on surface, Surface-image and Multilayer studiables. It provides faster results while having fewer defects at small scales.
Default settings modified in 3D view study	Some default settings for the 3D view study have been changed to improve visualization. The option for Gloss rendering is defined to Shiny (instead of Soft). The zoom factor is increased slightly to reduce the empty space around. The Optimize setting of Height amplification gives a flatter surface.
	Especially useful for correlative analysis:
	New Multi-channel image studiable
New type of studiable: Multi-channel image	The Multi-channel image studiable replaces and enhances the Multilayer surface studiable. It allows inclusion of images of any type in true color, in addition to other channels (topography, phase, deflection…), to form a single studiable for simultaneous manipulation and analysis. It gathers, in one studiable, channels with different XY offsets and resolutions. All the operators and studies for the now-obsolete Multilayer surface studiables have been adapted to the new Multi-channel image studiable. This includes the re-reading and conversion of existing documents and the opening of all compatible file formats. The user will have to open and save the old Templates and Minidocs on Multilayer in order to use them on Multi-channel.
	Especially useful for SEM users:
	Segmentation from gray level in Particles

New Multiple threshold detection in Particle analysis study	A new “Multiple threshold detection” segmentation method has been added in the Particle analysis study. This method is useful for chemical analysis of BSE images from SEM instruments. It can be applied on gray scale images or channels with non-metric units. It detects particles by defining ranges over grey level values and creates a new “Material number” parameter that can be used for the classification.
	### Post-treatments in Stereoscopic reconstruction
Level option in Stereoscopic reconstruction operator	A new Level option (post treatment operation by subtraction of mean plane) has been added in the Stereoscopic reconstruction operator dialog box. This is useful on flat surfaces with a slope to ease the fine tuning of the other reconstruction settings.
Relief inversion in Stereoscopic reconstruction operator	The new Invert relief option, added in the Stereoscopic reconstruction operator, allows you to mirror the Z data. Inverting the order of the images in the pair then inverting back the heights will give equivalent results but however changes the main angle of view (i.e. the image of the pair on which the calculated heights are mapped); this possibility is e.g. useful to associate EDX maps afterwards on the topography, at the correct vision angle, to avoid a shift between topography and chemical maps.
	## Especially useful for SPM users:
	### Indentation models
Improved calculations on indentation models	The detection of the I0 point for the DMT model has been improved and the fitting quality between the model and the real data optimized.
	### Coefficient of determination on force-curve indentation
R^2 coefficient in Force curve indentation	The coefficient of determination R^2 has been added in the indentation parameters of force curves, in order to estimate the quality of the curve, or of the fitting.
	### 3D view of data cubes
New 3D view study for I-V spectroscopy image	You can now display a “3D view of the I-V spectroscopy image“ study on the Hyperspectral image studiables. It allows to slice through the data cube along its different axis (X, Y and ramp axis).
	## Especially useful for Spectroscopy users:
	### New spectral instrument family
New Digital Surf products for the Spectral instrument family	Mountains® now offers three new products for the spectral instrument family: Mountains Spectral Correlate, Expert and Premium. The user can try them with a Free trial licence or an OEM demonstration licence, using the "Product Version Configuration” dialog. The spectral products complement the range, in addition to Profilometry (2D), Surface Topography (3D), Scanning Electron Microscopy and Scanning Probe Microscopy Products.
	### Composite renderings
Composite renderings for Multi-channel images	The user can define new composite renderings on Multi-channel image studiables, in order to visualize several chemical maps, or to add a transparency effect. A new "Composite rendering" button is available in the ribbon of the Pseudo-color view, 3D view and Colocalization studies. This new rendering option allows the user to choose the channels used in the composition. A dialog defines how to mix the color: Mixed (color addition per pixel), Unmixed (main color of each channel per pixel) or Saturated (main saturated color of each channel per pixel). Low values can be suppressed by a configurable threshold. It is also possible to visualize one of the channels as a background with transparency effect. The changes are viewed in real time.

	3D view study on Hyperspectral images
New 3D view study for hyperspectral images	You can now display a "3D view of a hyperspectral image" study on Hyperspectral image studiables. This allows you to see inside and slice through the hyperspectral cube along its different axes (X, Y and spectral axis).
	Especially useful for Clouds or Shell (freeform surfaces) users:
	Shell
New Metrological filter operator on Shells	The new Metrological filter operator on Shells calculates a reference shell by low-pass filtration (equivalent to waviness) and from it, calculates deviations between the shell and the reference (equivalent to roughness). For each point, roughness values are stored in the studiable as a complementary information called Deviation. The operator can generate the original source Shell completed with deviation values (roughness), and the filtered shell (Waviness) completed with deviation values (roughness). Available filters are: Gaussian-like filter and Bilateral filter. The user can choose the cut-off value that separates long and short wavelengths. This operator can only be used if the "Correct the shell" operator has been previously applied in the workflow for this studiable.
Roughness (deviation) values in color on Shells	The deviation (roughness values) can be displayed as color in the 3D view study on Shells. This allows you to visualize the roughness either on the original shell, or on the filtered shell generated by the Metrological filter operator. A color scale can be displayed, the color palette can be modified, and image enhancements can be applied. This deviation display is only available if the "Metrological filter" operator has been previously applied in the workflow for this studiable.
Surface texture parameters on Shells	Surface texture parameters on Shells can now be calculated in the Parameters table study. The parameters can be calculated from deviations, either from a nominal form if your shell is very close to this nominal form (plane, sphere, cylinder, cylindroid), or from the waviness component with an included adjustable filtering. Height parameters (Sa, Sq, Ssk, Sku, Sp, Sv, Sz) can be selected. Hybrid parameters (Sdq, Sdr, Sdrp, Srf), Functionnal parameters (Smr) and Volume parameters (Vmp, Vmc, Vvc,Vvv) are available only on a nominal form for the moment.
Curvature values in color on Shells	The curvature (local curvature radius) can be calculated and displayed as color in the 3D view study on Shells. Several curvature calculation methods and settings are available in a configuration dialog. The color scale can be displayed, color palette can be modified, and image enhancements can be applied. This curvature display can only be used if the "Correct the shell" operator has been previously applied in the workflow for this studiable.
New Correct the shell operator	The new "Correct the shell" operator detects and corrects non-conformities of a Shell studiable. The user can choose also to smooth the rendering stored in the studiable: with smoothing, each triangle is displayed with a gradient color (instead of uniform color).
New Remeshing operator on Shells	The new Remeshing operator allows you to optimize the localisation of triangles in the mesh. It reduces calculation times thereafter. The user can determine a number of points to reach. This operator can also be used to obtain a shell with a lower resolution. This Remeshing operator can only be used if the "Correct the shell" operator has been previously applied in the studiable workflow.
New Extract area operator on Shells	The "Extract area" operator allows you to extracts an area of interest contained in a rectangular box from a Shell studiable. It generates the extracted sub-part of a shell as a Shell studiable.
	New Cloud studiable
"Cloud": New type of studiable	You can load 3D point Clouds into the software as "Cloud"-type studiables from an ASCII file (X,Y,Z), an ASCII file with color information (X,Y,Z, R,G,B) or an ASCII file with intensity (x, y, z, I).

New 3D View study on Clouds	Cloud studiables are displayed in an interactive 3D view study. User can choose the color and size of the dots. Usual 3D view settings are available (Light intensity, brightness and configuration, Display of axis, dimension block, axis system, predefined views, animations, image export…)
New Surface extraction operator from Clouds	The "Extract projected surface" operator on Cloud studiables allows the user to transform a point cloud according to the desired orientation, into a continuous surface studiable type.
	Especially useful for Tomography (FIB-SEM, Spectroscopy) users:
	New Multi-channel cube studiable
New Multi-channel cube studiable type	You can now load a cube of voxels into the software as a "Multi-channel cube" type studiable. This enables the analysis of chemical composition tomography. Multi-channel cubes are used to analyse in full 3D the volumic abundance of several chemical elements mixed, for example coming from FIB-SEM or Raman analysis. Each voxel of the cube stores several numbers (one number per channel) corresponding to the chemical abundance of several chemical components. As a start for this version, Mountains® will limit the resolution of cubes to 16 megavoxels. In the case of SEM-oriented products, in order to handle cubes originating from FIB-SEM tomography in BSE mode, this studiable also allows using a single channel. In this case, each voxel is a single number representing a gray level.
	New 3D view of a cube study
New 3D view study for Multi-channel cubes	The default study for Multi-channel cube is the 3D view study. Three types of representation can be displayed and combined: Plane, Block and Segmented grains. The colors can be defined by: - a mixed color mode: mixed contribution all chemical channels, each as a color. - or a segmented mode: for each voxel, only the most abundant material is considered, which forms homogeneous grains of uniform color. - A Plane is a section of the cube perpendicular to an axis, movable to any position. You can also display the background, which is composed of the three planes at the bottom of the cube. All these planes are always in mixed color mode. - A Block is a rectangular box, that can be shortened or drilled from inside along any XYZ direction. Blocks can be displayed in segmented or in mixed color modes. - Segmented grains are grains in full 3D, representing a single dominant material in a single color. You can launch many customised animations to visualize successive positions of the planes or of the Block edges, or successive channels of the segmented grains. A segmentation button of the ribbon allows to define a significancy low threshold for each channel. In the case of BSE (gray level, single channel), segmentation is done by multiple thresholds, which define several channels. Segmented grains can be smoothed to avoid the actual voxels being visible as tiny cubes. Usual 3D view settings, animations and exports are available. If the 3D view contains segmented grains, or a block with segmented grains, it can generate a dynamic colored Shell studiable.

	New Multi-channel cube analysis study
New Multi-channel cube analysis study	The Multi-channel cube analysis study gives information about grain counts and grain volumes, for each of the channels and as a proportion of the total.
	Multi-channel cube: new Extract slice operator
New Extract slice operator on Multi-channel cubes	The Extract slice operator generates a Multi-channel image (containing the same number of channels) by extracting a slice along the X, Y or Z axis. It can also generate an image (similar to plane in color mix of the 3D vew described above), or one of the channels as an image in gray level.
	General features and GUI:
	Dark default color theme
Added color themes	Mountains® 9 introduces a new contemporary "Black" screen theme. A new orange theme is also available beside the classical version 8 gray theme, together with white and blue.
	Updated icons design
Modernized icon design	Icons have been redesigned in the new style of the software.
	Improved workflow visibility
Collapsing and extending a workflow branch	It is now possible to collapse (and expand) the content of the workflow that follows an operator or a studiable, in order to simplify the visualization of a complex workflow.
Search zone in workflow	A search zone allows you to quickly find a Studiable, operator or study in the workflow, using a portion of its name.
Highlight selections in Workflow	The workflow displays new colors for a highlighted selection: blue for studiables, green for studies, and orange for operators. The studiable numbers are now displayed on the left for better studiable identification.
Simplified icons for operators and studies in workflow	The default icons for operators (respectively studies) of the workflow, now simply represent an orange gear (respectively green calliper). The "Preview" button switches to the display of the icon representing the displayed operator (respectively study).
Multiple selection of results:	It is now possible to select several numerical results in the Results manager, in order to add them in one right-click in the same Table of results, or in a Result calculator formulae. It is also possible to copy several results in order to paste them in another application, and to delete several results from the studies.
	Widespread advanced Plug-ins
Generalised Plug-ins	The possibility to use customized addon plug-ins is now included in all Mountains products.
Improved Plug-ins:	Addon plug-in tools (cutomised Operators and Studies) can now be applied on several source studiables, and on results contained in the Results manager.
	Updated Welcome and About dialogs
Clearer Welcome dialog	The Welcome dialog page has been partly reorganized to highlight the basic resources, and add a link to "What's new in V9.0?"
Modernized About dialog	The About dialog has been modernized.
	New help links in operators
Added Help access	A new [?] button now appears in the title bar of most dialog boxes, to open the corresponding page of the reference guide. The information in the dialogs (in purple) is now replaced by an [i] image and an information tooltip in some dialog boxes.
	Completed and updated Index, Templates, Tutorials and example studiables
Updated Templates and Tutorials	Templates, Tutorials and Index documents have been relooked, reorganized and completed to illustrate new features. Example studiables have been added.

	Renamed studiables
Multi-channel profile renamed	The Multilayer profile studiable has been renamed Multi-channel profile.
Spectral studiables renamed	The Hyperspectral cube studiable has been renamed Hyperspectral image. The CITS spectrum studiable has been renamed I-V curve. The CITS cube studiable has been renamed I-V spectroscopy image.
	Reference guide
Updated English Reference Guide	An updated "Reference guide" is available in English. Some information about new features may still be missing. It will be completed in an upcoming Service Pack. The "Reference guide" in German, French, and Japanese will be made available in the next Service Pack.
	Operating system
Only 64-bit Windows 10 OS is supported	The technical specifications for Mountains version 9 can be found here : https://www.digitalsurf.com/support/technical-specifications/

Bug corrections (A and B type)

	Type	Bug Description
MNT-2379	A	A crash can occur when applying the High-pass/Low-pass filter operator on a very large image if the Robust Gaussian filter is selected.
MNT-2564	A	A crash can occur when applying the Robust gaussian filter on a very large studiable.
MNT-2726	A	The software may crash when saving a large studiable in 3MF format.
MNT-2953	A	Mountains may crash when saving a spectrum studiable in .txt format if one spectrum per column is selected.
MNT-2972	A	It is not possible to apply the Level operator using the By rotation option on a Surface+image studiable if there are non-measured points present.
MNT-854	B	The inclusion and exclusion of spectrum curves in the Sort spectra operator on Hyperspectral image studiables are always active when removing a result from the operator in the workflow and recalling the operator.
MNT-1846	B	The choice of detection and calculation layers is not saved in the settings in the Particle analysis study.
MNT-1986	B	Saving studiables is no longer required when dragging and dropping studiables from the workflow into the studiable explorer.
MNT-2441	B	The result of the Generate as dynamic studiable is not created in the workflow if a residue or a deviation is selected for this feature in the Advanced contour study.
MNT-2517	B	The text 'Activation code' is not translated in the license activation dialog when installing the software.
MNT-2619	B	Multiple built points of the Contour analysis study sometimes disappear after a studiable substitution.
MNT-2625	B	The automatic mode for the positioning of all the cursors in a Force curve analysis study is deselected if a cursor is moved.
MNT-2838	B	The automatic structure exclusion calculation in the Level operator is incorrect on Surface, Surface+image studiable if the studiable contains non measures points.
MNT-2852	B	The Parametric profile studiable generated by the "Extract profile parameter" on a Shell studiable may be erroneous.

MNT-2982	B	The Cancel button in the Image Enhancement dialog box for Image studiables doesn't work.
MNT-3005	B	The "Bring the profile next to the DXF" option when importing a DXF file in the Contour analysis study doesn't work.
MNT-3040	B	Memory usage is abnormally large in the 3D View of the Distance measurement study in the SPM - Basic analysis tutorial document.
MNT-3044	B	The Parameters table study on a surface studiable can not be calculated if this surface was generated by the Mathematical Function operator using previously calculated parameters.