Avizo for FEI Systems 8.1

3D Analysis Software for Scientific and Industrial Data
Materials Science – Electronics – Digital Rock Physics

Dear Avizo User,

With this document we would like to inform you about the most important new features, improvements, and changes in this version. Please read these Release Notes carefully.
We would appreciate your feedback regarding this version. If you encounter problems, but also if you have suggestions for improvement, please report them to vsghotline@fei.com.
We would like to thank you in advance for your efforts.

April 2014, the Avizo and Amira team

CONTENT

OVERVIEW

Avizo for FEI Systems 8.1 is a new release dedicated to FEI electron microscopy systems and correlative microscopy workflows, including some important new features, enhancements, performance improvements, and issue fixes.

For major changes introduced in Avizo 8.0, please refer to the *Avizo 8.0 Release Notes* and the *What's new in Avizo 8.0* document.

AVIZO FOR FEI SYSTEMS - ENHANCEMENTS AND NEW FEATURES

NEW SOFTWARE INSTALLATION AND LICENSING

New License Activation

A new License Management has been introduced in Avizo 8.1, which greatly simplifies operations such as upgrading or transferring licenses. Upon receiving activation codes corresponding to acquired licenses, simply copy/paste the activation keys into the License Manager to complete the on-line activation. Please refer to Avizo License Manager Help for more details about license activation, transfers, and upgrades.

NEW AND ENHANCED FEATURES

New DualBeam 3D Wizard

The DualBeam 3D Wizard is dedicated to pre-processing of SEM image series acquired from FEI DualBeam systems for reconstructing 3D volumes, for instance to enable subsequent image segmentation. This module, which supersedes the former FIB Stack Wizard, guides user though the following steps:

- Geometry correction to compensate for stage tilt foreshortening and/or vertical shift. Stage tilt is retrieved automatically in images imported from FEI Auto Slice & View™.
- Bad slice removal and interpolation after alignment.
- Alignment, with optional reference and mask region in cut face area or fiducial outside milling area.
- Interactive cropping.
- Reduction of curtaining artifacts with FFT Filter.
- Noise reduction with Non-Local Means Filter.
- Intensity shading correction of background defined by threshold, box, drawing, or arbitrary mask image.
- Save data or project.

Some processing steps are optional and can be skipped. You can go back to a previous step to correct settings and apply again processing, unless the option "remove intermediate data" has been set in order to reduce memory consumption.

Avizo for FEI Systems 8.1 release notes – FEI© 2014
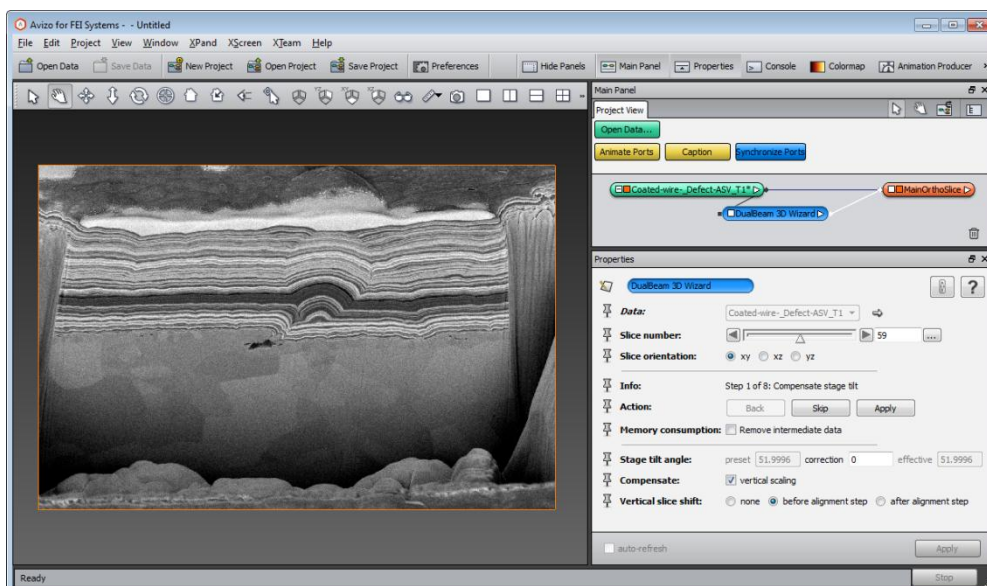
Enhanced Units Management

Units Management is now activated by default in Avizo for FEI Systems. Working units (how data coordinates are stored) and display units are both set to nanometers. Units Management can be disabled or configured in Preferences.
To learn about units management in Avizo, see the chapter 12 (Units in Avizo) in the Avizo User's Guide.

FEI TIFF and MRC files automatically set the data units when loaded. Upon loading a data file with unknown units, you can select the units to be used for this file and subsequent ones.
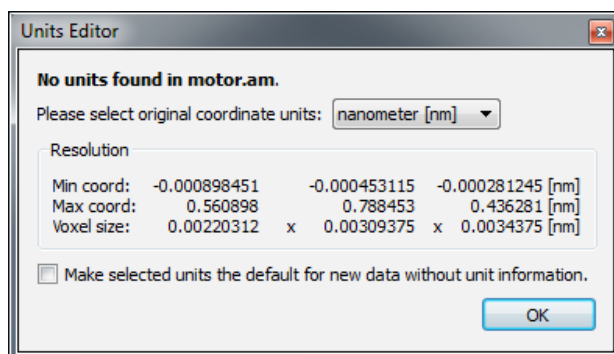
The Image Read Parameters dialog now also allows you to set the coordinate units.
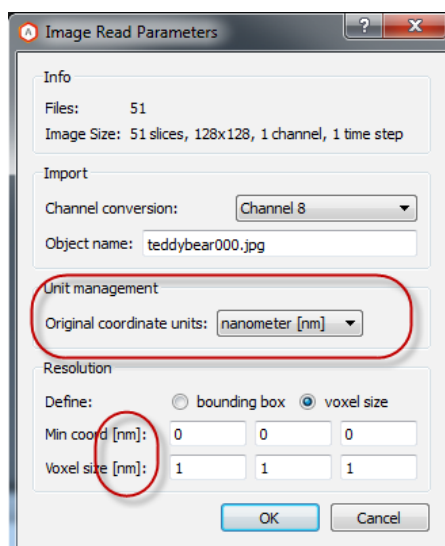
A new preference is added to specify which units must be selected when loading data files with unknown units.
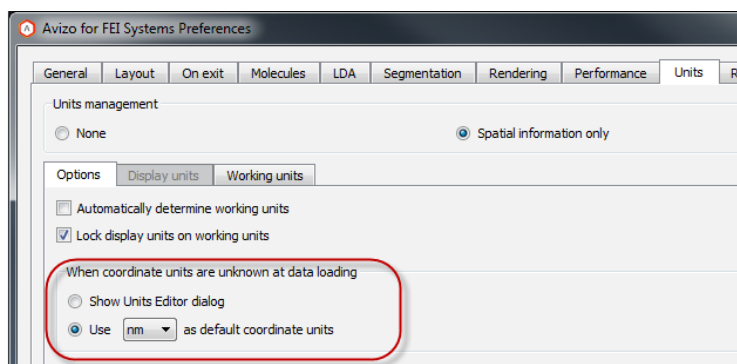
The units defined for data are saved in project files.

Avizo for FEI Systems 8.1 release notes – FEI© 2014

It is now possible to quickly change the display units from the viewer panel, as an alternative to using the Preferences dialog. Note, however, that a number of modules still don't take into account the display units setting and will still show and input *working units* instead.
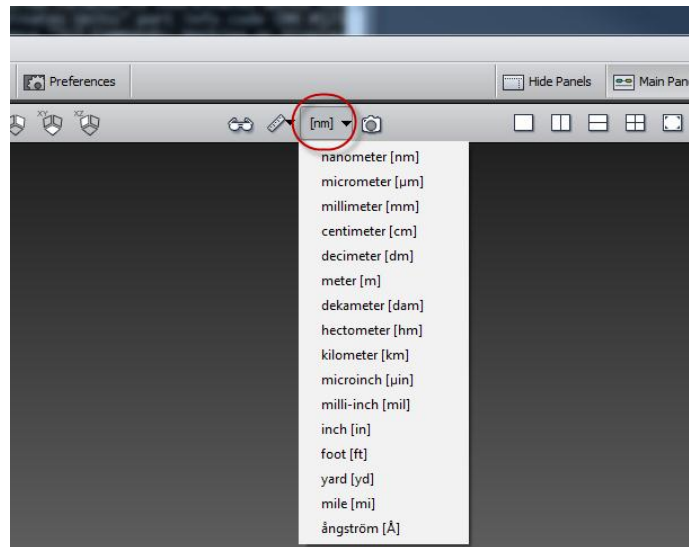
The "Coordinate Units" information port has been removed for clarity.

See also the section "Script enhancements and new Tcl commands" about related Tcl changes.

Help enhancements

Online help has been enhanced for better readability.

Also it is now possible to use the backspace key to go to previous page.

New FFT Filter module

The new module FFT Filter is available for frequency domain filtering of 2D and 3D images based on fast Fourier transforms. This module is a powerful tool to filter periodic noise or structures. It can be very useful, for instance, to reduce curtaining artifacts (vertical stripes) in FIB/SEM images. Filtering large structures (low frequencies) can be used for shading corrections. Filtering small structures (high frequencies) can be used for smoothing. Two modes are available in this module. The Spatial mode exposes simplified parameters for setting structure size or stripe orientation and tolerance relative to input image. The Frequency mode exposes extended parameters for band filtering, notch filtering (spots), and directional filtering relative to the Fourier transform image. This latter mode allows export of the filtered FFT magnitude image for visual control in the frequency domain.

Avizo for FEI Systems 8.1 release notes – FEI© 2014
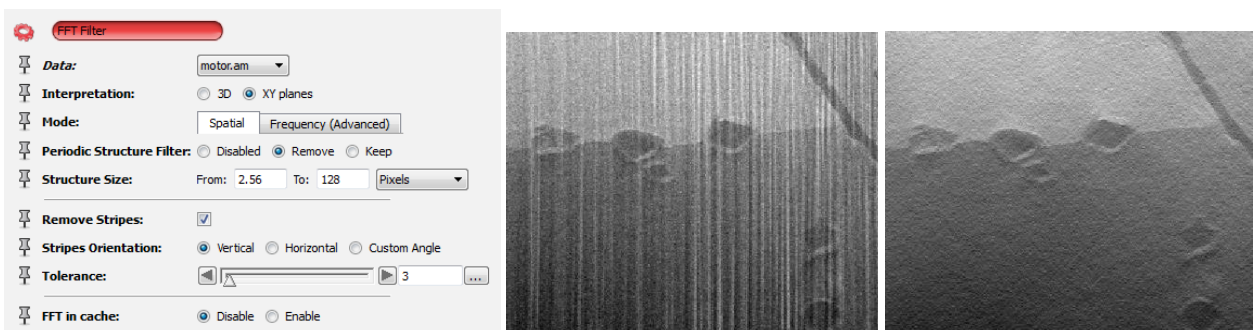
Enhanced module Porosities Analysis Wizard

The Porosities Analysis Wizard module now uses the Table Panel for displaying quantitative results.

Voxelized Rendering is now optionally used for rendering voids in 3D. This technique avoids the surface generation time.

New module Intensity Integrals

The new module Intensity Integrals computes the sum of voxel intensities of an image or uniform scalar field.

NEW AND ENHANCED FILE FORMAT SUPPORT

Enhanced reader for FEI SEM TIFF Series

When importing FEI TIFF images, a new dialog displays image information including pixel size retrieved from FEI TIFF tags. This dialog allows you to set the slice thickness and to automatically trigger the DualBeam 3D Wizard once the stack is loaded. FEI TIFF tags such as acquisition settings are read as data parameters with a group section gathering parameters common to the whole stack. See the Avizo User's Guide for more details about TIFF format and the Data Parameter Editor.
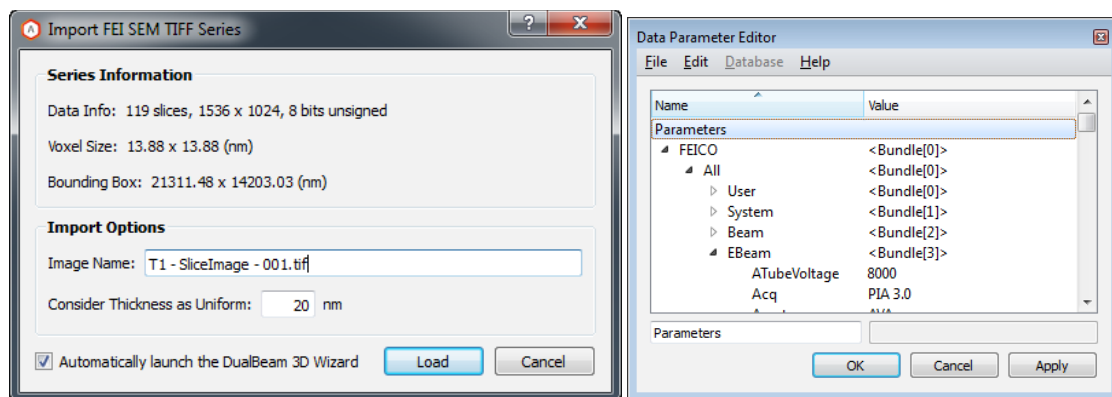
New reader for Auto Slice & View xml project format

Avizo can now directly import project files saved by FEI Auto Slice & View™ (ProjectData.xml). A dialog allows selection of the image series to be loaded, displaying a preview and retrieved image information including the target thickness. By default, the DualBeam 3D Wizard is automatically started once the stack is loaded.

Avizo for FEI Systems 8.1 release notes – FEI© 2014
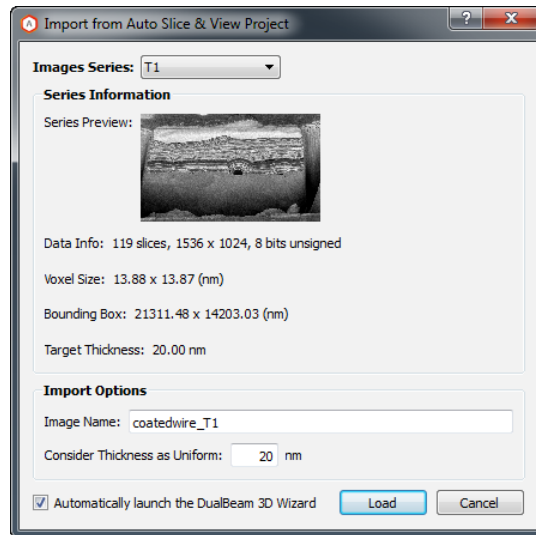
Enhanced MRC reader

The Avizo MRC reader now creates uniform scalar fields, which allow more flexible operations than the stacked scalar fields used previously. A data parameter Sequence is set however, and displayed in data information to remind the user that the loaded stack may not be considered as a 3D volume. Extended MRC header information is read as data parameters, and can be accessed by using the Data Parameter Editor.
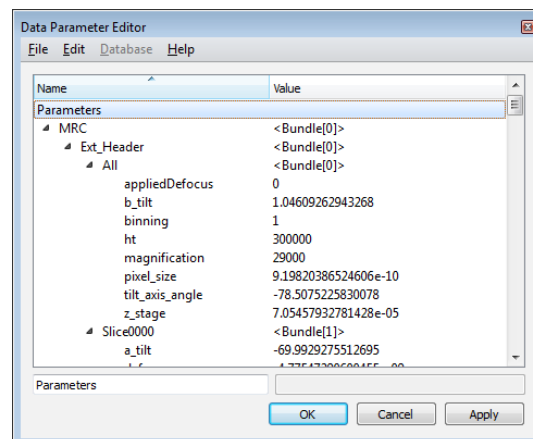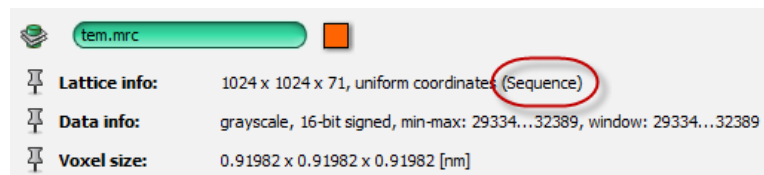
SCRIPT ENHANCEMENTS AND NEW TCL COMMANDS

New commands getSlice/setSlice for image stacks

New commands are now available to retrieve or replace a particular slice in an image stack (uniform scalar fields). These commands can replace in scripts the formerly used Quantification:getPlane and Quantification:setPlane commands.

```
getSlice xy|xz|yz <sliceNumber>
setSlice xy|xz|yz <dstSliceNumber> <srcSliceNumber> <srcSliceImage>
```

Enhancements related to Units Management

A new option "-unit" has been added to the Tcl load command for persistence of file units in project scripts.

The preference "Tcl Commands: Working or Display" has been removed to prevent a possible script compatibility issue: Tcl commands should always use working units.

Script modules can define a callback command to react to changes of display units by the user.

Avizo for FEI Systems 8.1 release notes – FEI© 2014

Avizo for FEI Systems 8.1.0 provides various enhancements and solutions to known problems including the following:

23290	**Convert Image Type**	The option "clean labels" now works on 16-bit and 32-bit label data.
23146	**Crop Editor**	The Crop Editor now preserves the orientation of attached Slice modules when data dimensions are changed (cropping).
23277	**Volume Edit**	A precision issue has been fixed. In some case the result was not matching the box tool.
23189	**Generate Surface**	Generate Surface required a lot more memory since Avizo 8.0 when using multiple CPU cores. Memory consumption has been dramatically reduced.
23196	**Surface Area Volume**	Performance has been dramatically improved in particular with surfaces containing a large number of patches.
22957	**Caption, Display Date**	Annotations could disappear when setting the view transparency mode to "sorted layers delayed".
23269	**MRC format reader**	The bounding box was displayed incorrectly when importing MRC files with extended header.
23161	**VGI format reader**	Some VGI files were loaded incorrectly.
22696	**LSM format reader**	Channel selection is no longer limited to 8 channels.
22341	**CSV Point Cluster format reader**	Some issues have been fixed for reading CSV files. It is now possible to use any columns combination for coordinates and values.
23238	**Animation Producer**	Avizo can now reload correctly previously saved projects containing animations with an empty name.
23186	**Tcl scripting**	Function key procedures are now triggered also when the focus in on the viewer window. Function key procedures are no longer called multiple times when switching with full screen mode. For information about defining script procedures for function keys, see the section 11.4 "Avizo Script Files" in Avizo user's Guide.

23311, 23195	**Label Analysis (Avizo Fire)**	In some cases, measures depending on z voxel size - such as BarycenterZ - could be incorrect.

The measure FeretShape3D could give incorrect results in some case. The sampling scheme has been improved. For higher accuracy, you can increase the number of samples in the Label Measure Attributes dialog accessible from the Selection of measure groups. |
23292	**Volume Fraction (Avizo Fire)**	Volume Fraction could give incorrect values in some case when used with a mask.
23218	**Analysis Filter (Avizo Fire)**	Analysis Filter could fail in some case when auto-refresh was enabled.
23163	**Watershed Segmentation (Avizo Fire)**	Using Gradient input could cause a failure making any subsequent module hidden in the project view.
21023	**Ortho Views (Avizo Fire)**	Line probe points could not be selected in Ortho Views 2D view in some case when input was transformed.
22075	**Avizo XPand, CUDA**	New packages created with XPand development wizard do not force linking with CUDA and OpenCL by default anymore. The examples package "mypackage" is not linked with CUDA or OpenCL. Only CUDA examples are linked with the necessary libraries. A custom package using GPU computing requires its Package file to be modified by hand.
23492	**Avizo XScreen**	XScreen is no longer limited to two buttons when using the VRPN device interface. For defining callback procedures for buttons (scripting), see the section 19.1.7.5 "Tcl Event Procedures" in the Avizo User's Guide.
20899	**3D Viewer**	The 3D viewer dimensions are now correctly set according to TCL command *setSize*.
21537	**Generate Surface**	A crash occurring when applying Generate Surface to large label fields has been fixed.
22441	**Anisotropic Diffusion**	When applied to a large volume, the module failed. It has been fixed.
22837	**Histogram**	An error in the extension of histogram plot saved as Avizo spreadsheet format has been fixed.
23536	**NominalActualComparison script object**	The script object has been fixed for Linux and OS X.
23714	**Convert To Large Data Format**	Documentation has been improved. Command convertToDiskData is fully documented.

23727	**ANSYS format writer**	Some .ans files generated with Avizo could cause errors at loading in Ansys Mechanical. This has been fixed.
23736	**Project View**	It is now possible to drag and drop a file on the Project View when it is undocked.
23765	**Material Statistics (Segmentation Editor)**	Pressing the Export into Workspace button in the Material Statistics panel of the Segmentation Editor doesn't create a hidden duplicated object anymore.
28425	**ROI Box For Volume Rendering**	When creating a ROI box by right-clicking on Volume Rendering Settings, the newly created ROI is now connected to the Volume Rendering Settings.
28491	**Interactive Thresholding**	The filter preview has been fixed to match correctly the result.
28544	**Nifti format**	Files of size greater than 4GB can now be saved in Nifti format.
28545	**Analyze 7.5 format**	Files of size greater than 4GB can now be saved in Analyze 7.5 format.