Release notes
Amira–Avizo Software
Version 2020.3

3D data visualization and analysis

The aim of this document is to inform you about the most important new features, improvements and changes in this version of Thermo Scientific™ Amira-Avizo™ Software.

Please read these Release Notes carefully.

We would appreciate your feedback regarding this version. If you encounter any problems or have any suggestions for improvement, please do not hesitate to contact us at FRBOR.3d_hotline@thermofisher.com.

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Thermo Scientific License Manager

The Thermo Scientific License Manager is the new license activation tool that replaces the previous License Manager. This standalone application is installed during the Avizo/Amira installation process. It allows you to activate all the Thermo Scientific products providing a unified and much user friendly experience, both for node locked or Flexnet ^{TM} server-based licenses. The tool is also designed to support you in the deactivation and license renewal process.
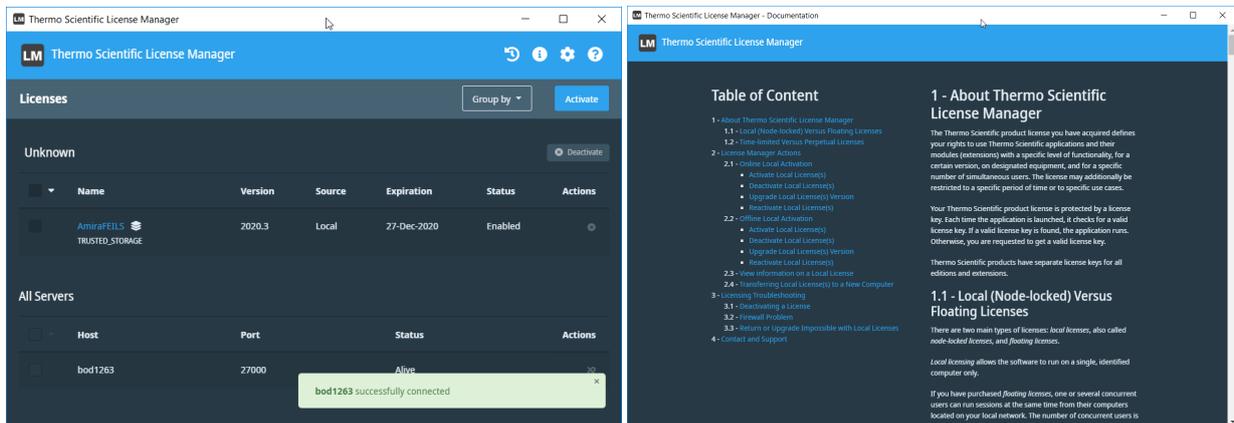
New activaton codes, incompatible with Avizo and Amira legacy ones, are needed to activate Avizo and Amira software starting from version 2020.3. Precisions about the migration will be provided in the mail containing new activation codes.

VGL file readers

VGL proprietary file readers are now available in Avizo and Amira software for all supported platforms.

Illuminated Lines

The module Illuminated Lines now exposes parameters which were previously only available through TCL commands, to display the line set with Directionally Encoded Colors (DEC), and to adjust the Line Width.
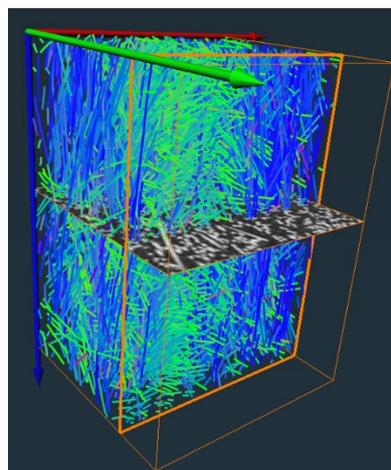

Figure 1: Fibers in Glass Fiber Reinforced Composite, visualized with Directionally Encoded Colors

EM Toolbox

The EMToolbox is a full suite of image manipulation and image processing tools designed for pre-processing of large image stacks. The toolbox features unique, fast and robust tools for linear or elastic slice alignement, as well as denoising, equalization and contrast enhancement algorithms. Primarily designed for serial section electron microscopy, the algorithms may be applied on any kind of serial section grayscale images stored as a set of TIFF files. Although individual slices must fit in memory, the entire stack may exceed the available RAM. The toolbox relies on disk-to-disk processing, and offers modules to access, process and even visualize the entire stack in 3D. The most common tools can be programmed to execute in an automatic sequence.
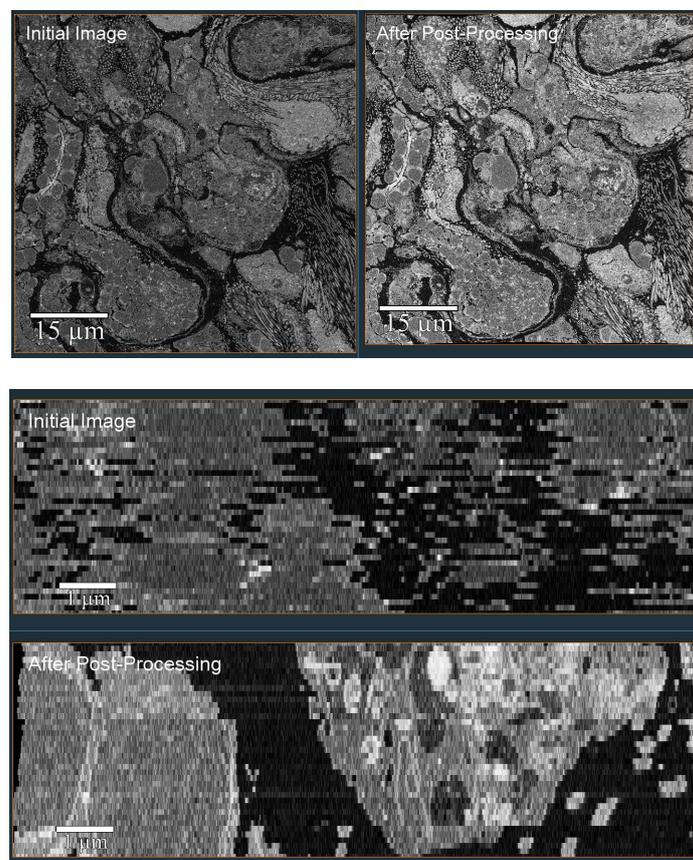

Figure 2: Comparison before and after post-processing with the EM Toolbox, performing contrast enhancement, linear, and elastic stack alignement.
Top: in-plane comparison shows the contrast improvement using the same colormap, Bottom: cross-section comparison shows the effects of slice alignement.
Data courtesy of Karol Malota, Department of Animal Histology and Embryology, Faculty of Biology and Environmental Protection, University of Silesia in Katowice

The list of new modules is:

- Tiff Stack Access: Out-of-core access to slice data in TIFF format.
- Tiff Stack To Volume: Extracts subregion to memory.
- Tiff Stack To HNLDF: Builds an hybrid file enabling 3D interactive visualization of a large stack of TIFF images.
- EM Post Processing: Out-of-core Image Processing using a sequence of scripts.
- Stack Normalization: Normalizes the histogram of a stack of TIFF images
- Gaussian Filter on TIFF Stack: Out-of-core 3D Gaussian filter on a stack of TIFF images

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- Stack CLAHE: Performs a Contrast Limited Adaptive Histogram Equalization on a stack of TIFF images
- Stack Alignment: Affine Slice Alignment using Feature Matching
- Stack Elastic Alignment: Stack Elastic Alignment based on Optical Flow
- Stack Flow Alignment: Performs affine slice alignment on a stack of TIFF images
- Stack Inner Rectangle: Crops a stack of TIFF images to its inner rectangle
- Stack Scale: Downsamples slices in a stack of TIFF images
- Process TIFF Stack: Process a series of TIFF images file by file

All these new tools are presented in a comprehensive tutorial and grouped in the EMToolbox category.

Amira-Avizo Improvement Program

Thermo Fisher Scientific introduces a new initiative in order to help us improve the quality, reliability, and performance of Amira-Avizo : the usage log.

If you choose to participate, Amira-Avizo will collect anonymous information about your hardware configuration and how you use Amira-Avizo in order to identify trends and usage patterns. No information regarding your proprietary data will be collected, and no personal data will be collected.

The Amira-Avizo's product management at Thermo Fisher will then analyze the data collected to figure out how users are using Amira-Avizo and design features based on how Amira-Avizo customers actually work.

The information will be used by the product management team as a decision making tool to propose the most relevant improvements and new features within our software product.

Thermo Fisher Scientific is committed to protect your privacy. We will not collect your name, address, or any other personally identifiable information. This data collection is safe, secure, completely anonymous and fully GDPR-compliant.

Avizo Software and Amira Software XDigitalVolumeCorrelation extension: Digital Volume Correlation improvements

With this version, we have greatly improved our Digital Volume Correlation experience with the addition of multiple modules that allow more advanced DVC analysis and pre-/post-processing steps. The user interface has also been restructured to simplify DVC analysis and allow the design of a better workflow.
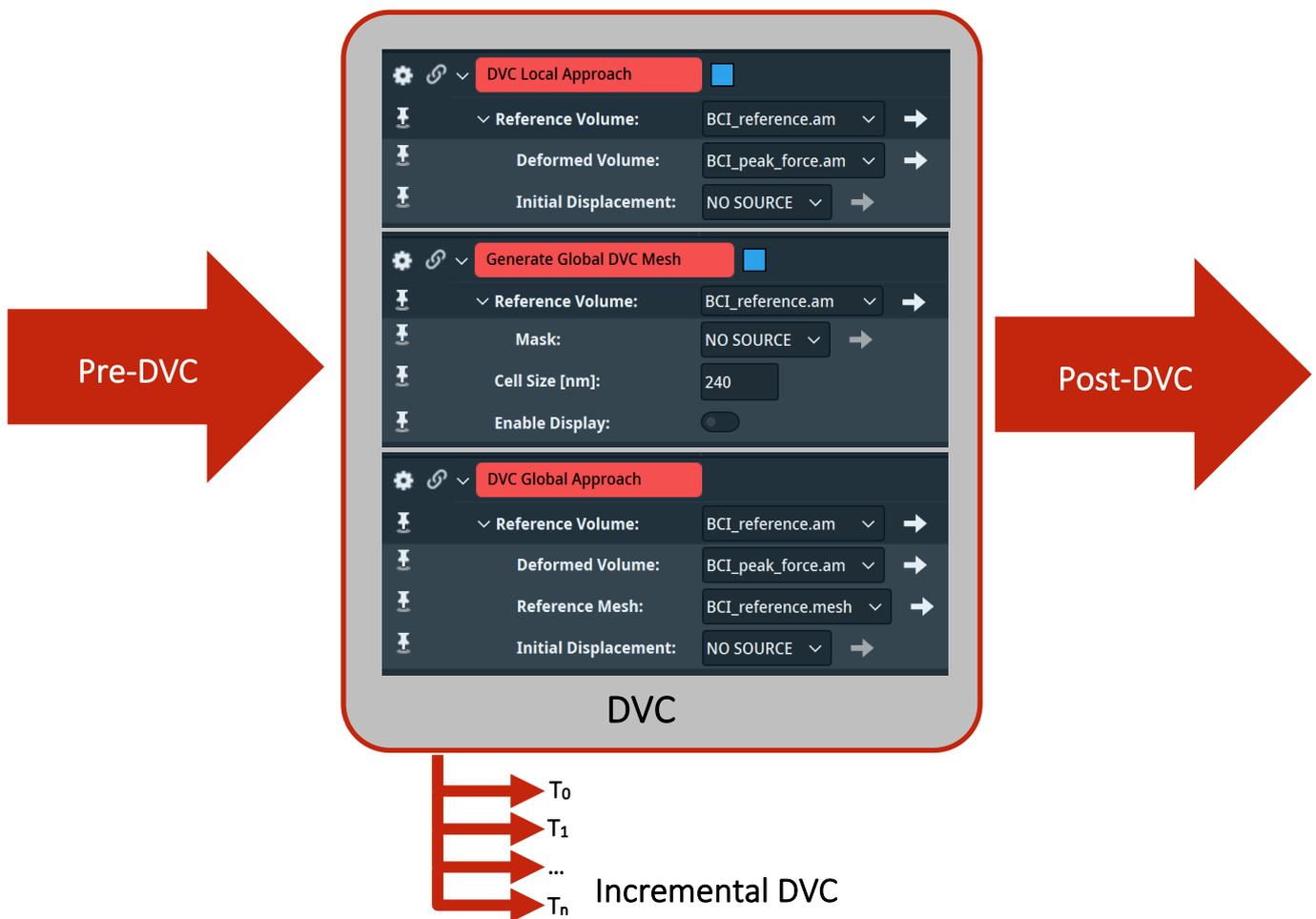
Interface

So far, both DVC approaches (local and global) and the generation of the mesh were nested in the same interface. From now on, each approach will be called from a separate module, which will greatly simplify the analysis. The mesh generation will also have its own module. For each module, the options remain the same.

The previous version with a single interface has been <u>DEPRECATED</u>. You will not be able to create it anymore. We strongly recommend you to update your workflow with the new modules.

Pre-DVC: quantify DVC uncertainties

The gold standard in DVC is to perform a "zero strain" study to find the best compromise between displacement/strain uncertainties and spatial resolution. A mesh sensitivity study based on two repeat scans collected prior the experiments is performed, thereby taking into consideration noise and reconstruction artifacts. This analysis can be tedious, and automation is key.

The new DVC Uncertainty Measurement module measures the systematic and random errors from two repeat scans for both local and global DVC approaches. The errors are stored in a table spreadsheet and can be plotted as a function of the cell size to identify the optimal size for your application.
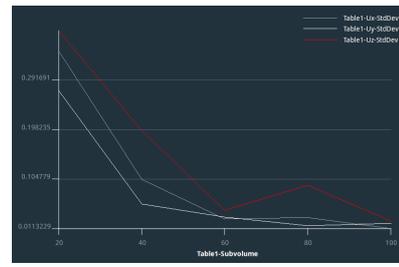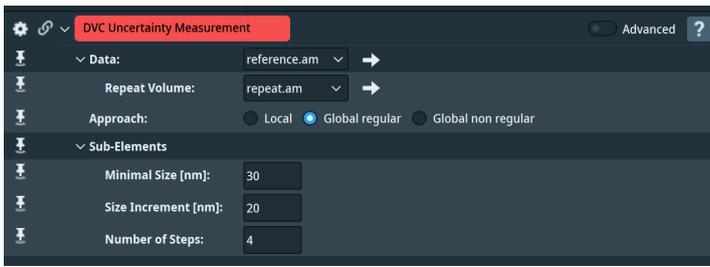
Incremental DVC analysis of time series

The new Incremental Global DVC module performs a DVC analysis when a series of volumes in the deformed configuration is analyzed. Depending on the application, the whole series can be analyzed according to the volume of the first scan (small strain) or incrementally when direct correlations are difficult or no longer possible (large strain). In the latter, the strains are computed from the cumulated displacements in the reference configuration after successive DVC computations. The deformed volume of the previous configuration becomes the reference volume of the next one, and the new mesh becomes the reference mesh deformed by the previous displacement field.

This new module will speed up your analysis so you can better understand the whole mechanical history of your material, enabling direct comparisons with small/large strain FE simulations.
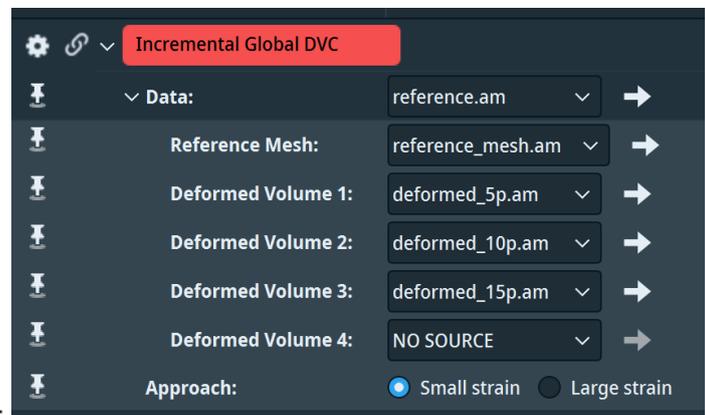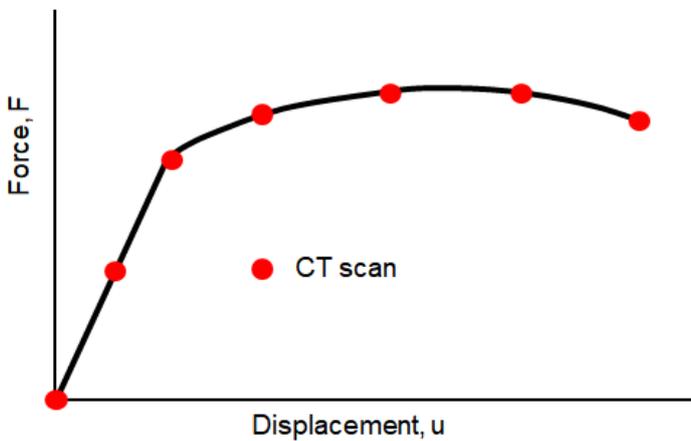
Post-DVC

SCALAR EXTRACTION

This module offers the options of extracting a list of important scalar fields from either a displacement field or a strain field. If the vector field is connected, the three vector components and the displacement magnitude are shown. If the strain tensor is connected, the six strain components of the Green-Lagrange strain tensor are shown. In addition, the strain invariants, principal strains, and equivalent strain (von mises strain) are also active.

DISPLACEMENT VIEW

Visualizing the displacement vectors after DVC computation can now be done in one click.
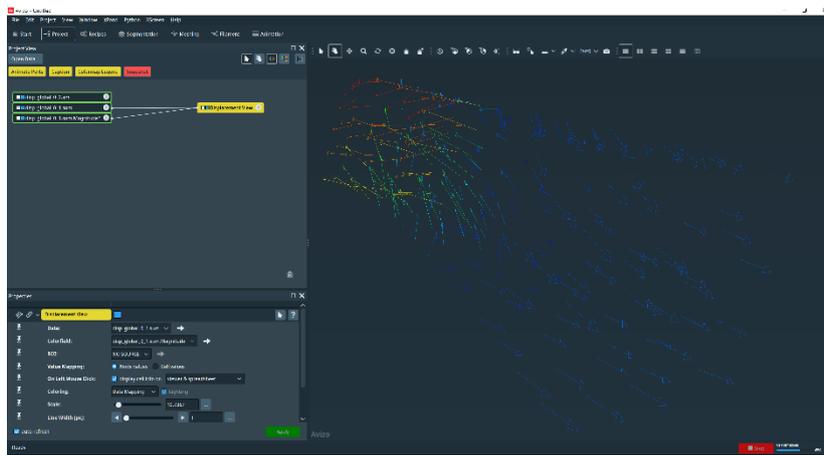
FILTERING DISPLACEMENT VECTORS

Filtering of the displacement vectors computed using the global approach is now possible. A region of interest and a radius filter can be selected to correct spurious vectors.

CONVERSION TO SPREADSHEET AND VOLUME

Users can now export the scalar fields to a spreadsheet for further post-treatment. Scalar fields can also be converted to Image Volumes to take your results to a next level: investigate deformation-induced microstructural changes with Thermo Scientific™ Amira-Avizo Software advanced quantification and analysis toolset and create advanced visualizations using tools such as Volume Rendering, Mapping onto a surface, Apply Deformation, or Vertex Morph.

Xtra Recipe Library

The following Xtras have been published since the previous version. Please pay attention to the product, license and OS requirements, as well as the installation instructions. Have a look, and do not hesitate to send us your feedback.

- Marker Based Watershed Recipe
- Export Measures
- Automatic extraction of surface cross section
- Auto Threshold for Multi-Thresholding
- Volume Projection
- Installation Instructions: AMIRA_LOCAL Setup Tutorial
- Explode Surface Animation Script
- Apply a Recipe on a Batch of Files
- Selective Border Kill
- 2D Cell Tracking Example
- Segmentation of agglomerated Ni nanoparticles

- [Cell Detection and Tracking 2020.2](#)
- [Hough Circle Fitting](#)
- [Multi-Scale Cylinder Correlation](#)
- [Create a porosity analysis recipe](#)
- [Segment TEM data without artifact and background effect](#)
- [Extracting and Visualizing Local Statistics from Fibrous Materials](#)
- [Interactive Top-Hat by Reconstruction.](#)
- [Imaging Codec for thumbnails in Windows Explorer](#)
- [XFiber Automation](#)

Compatibility notes

- The way to declare TCL Script modules and Python Script modules into the ressources file has been simplified; the former way is still supported but deprecated.
  Please refers to the section *Automating, Customizing, Extending > Configuring Popup Menus* of the online documentation for details.

End of support

Mac OS support will be discontinued

We thank you for choosing Thermo Fisher Scientific Avizo and Amira Software Solutions for your projects. In order to deliver the best value and focus on accelerating innovation we announce that with the release of Avizo/Amira 2020.3 we will deprecate the Mac OS support on our Software Products.

Avizo / Amira 2020.3 will be the last official maintained release on MacOS platform. There will be no new product development nor update on MacOS after this version.

This decision was made to ensure that we can increase innovation. We are confident that with this decision we will be able to provide more added value for our supported platforms, cutting-edge functionalities and continue to innovate to help you in your workflows and research.

You can still use the Mac OS versions of our Software Products and we will continue to provide bug fixes for 12 months. However, as new versions get released, we encourage you to transition to one of our supported platforms in order to benefit from our full support.

Windows 8 support is discontinued

As already announced, Windows 8 and Windows 8.1 operating system support is discontinued starting from this release.

XScreen feature removed

XScreen deprecated features have been removed from our Software Products.

Operating systems

Amira-Avizo Software version 2020.3 runs on:

- Microsoft Windows 10 (64-bit).
- Linux x86 64 (64-bit). Supported 64-bit architecture is Intel64/AMD64 architecture. Supported Linux distribution is CentOS 7.
- macOS Mojave (10.14) and macOS Catalina (10.15). The application runs on macOS Catalina (10.15) with a known limitation : the application cannot run in debug mode.

Avizo Software 2020.3 for Industrial Inspection runs on:

- Microsoft Windows 10 (64-bit).

To add custom extensions with Amira-Avizo XPand extension, you will need:

- Microsoft Visual Studio 2013 (VC12) Update 4 on Windows
- gcc 4.8.x on Linux CentOS 7
- XCode7 or greater on macOS

Solved issues 2020.3

2D-Histogram Segmentation	AA-11478	Readability has been improved when changing the display color.
Animation Director	AA-23756	The keyframe options now stay visible while in use.
	AA-23685	The keyframe options of a listed item are now editable when it is at the bottom of the window frame.
Automatic Brain Segmentation	AA-23461	Automatic Brain Segmentation module could sometimes output an empty label field depending on how the working unit was set. This has been fixed.
Dicom Reader	AA-23890	The Dicom reader is now able to read Dicom files with private implemented sequence tag (0009, 1010, 1210).
	AA-23377	The Dicom reader is now able to read Dicom files with private data element tag which is not a sequence.
Fiber Tracking	AA-23413	Fiber Tracking module cannot compute if used with mask materials without names, an explicit warning message is now displayed in the console when this occurs.
Filament Editor	AA-23717	Using Trace Filament and Move Selected Node tools on a 2D image data could lead to application instability, those tools are no more available for this type of data anymore.
Generate Tetra Mesh	AA-22624	Memory is now correctly released when a Generate Tetra Mesh module and its result are removed.
Image Ortho Projections	AA-22255	In the Min/Max Slice ports, an inconsistency existed between the displayed unit and the value. This has been fixed, the Min/Max Slice values are now expressed in voxels.
Membrane Enhancement Filter	AA-23449	The port Tensor Voting Scale is now hidden if Output Selection is set to Planeness.
Nifti reader	AA-23656	Nifti files containing time series can now be saved and reloaded without error.
	AA-11334	Nifti files containing time series can now be saved and reloaded without error.
Properties Area	AA-22140	For better performance, a limit to the maximum amount of properties that can be displayed at once has been added. Displaying more properties is still possible by using an option in the Preference dialog: Layout > Project View > Number of modules to display in Properties Area.

		The default value is 10 and this means that when displaying 11 modules (selected or pinned), the properties are not displayed but the user can explicitly display them by hitting "Show Selected objects" in the Properties Area.
Python Scripting	AA-22695	__file__ variable is now correctly defined and can be used in a Python Listing file (.apl) or a Python Script-Object (.pyscro).
	AA-23478	A new paragraph has been added in the User's Guide "Automating, Customizing, Extending > Python Documentation > Python Environment and Package Manager > Potential issues with PYTHONPATH" to explain the potential issues due to the variable PYTHONPATH and how to solve those issues.
	AA-23176	When launching the application, a check on the PYTHONPATH environment variable is done and a warning message is now raised if it is set.
Surface	AA-23750	It is now possible to load a big surface dataset. However, there is a software limitation that does not allow such surfaces to be displayed. The limitation has been documented and a warning dialog will pop up if the surface cannot be displayed.
Tiff reader	AA-23355	The images containing "inf" values are now converted replacing inf values to NaN value. The colormap range of such datasets can now be displayed without error.
VGL reader	AA-22437	Dimensions of a raw data are now correctly read.
Viewer	AA-23684	Viewer visibility status is now inherited by default from viewer 0.

Solved issues 2020.3.1

Avizo ToGo	AA-24324	When exporting a project in .togo format using the module Auto Thresholding with a non default value for the port Type, it is now possible to reload the project in AvizoToGo without error.
DICOM reader	AA-24286	8 bits DICOM files can now correctly be converted to floating precision at load when Rescale is used.
DVC	AA-24502	For DVC Uncertainty Measurement, DVC Local Approach and DVC Global Approach modules, the calculation is applied even if the reference volume and the deformed one have voxel sizes that differ for less than 1e-5 (difference not visible in the interface).
Licensing	AA-24966	It is now possible to correctly start the application when having both an expired and a valid license for the product.
Open Inventor Scene to Surface	AA-23984	Units are now correctly handled by this module.
Sieve Analysis	AA-24520	Extracts are now identical whatever input is a single 2D slice or a 3D with XY interpretation.
Slice	AA-23983	There was an origin calculation problem with NetCDF files. This is now correctly transcribed in the 3D space unit.
Tiff reader	AA-24895	Now Tiff images with only one channel are correctly loaded.
2D-Histogram Segmentation	AA-11478	Readability has been improved when changing the display color.