

# Amira 5.4

Advanced Visualization and Data Analysis

Release Notes  
Version 5.4.5

## Release Notes Amira 5.4

Dear Customer: With this document we would like to inform you about the most important new features, modules, and changes in this version. Please carefully read these Release Notes.

We would appreciate your feedback regarding this version. If you encounter problems but also if you have suggestions for improvement, please report them to [amirasupport@vsg3d.com](mailto:amirasupport@vsg3d.com)

We would like to thank you in advance for your efforts.

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## Accelerating Display and Computations

Multi-threaded compute modules	<p>Numerous modules have been accelerated and can now be executed in parallel on multiple CPUs and/or cores. The performance of such modules will increase with the number of cores used. How many cores are used can be controlled in the <i>Performance</i> tab of the <i>Edit/Preferences</i> dialog. The following modules have been accelerated:</p>
Asynchronous file loading	<p>Many file formats are now loaded in a separate thread. As a consequence, while loading you can interact with the GUI or even start loading another file. This will be especially helpful when loading large data sets.</p>
Asynchronous range and histogram computation	<p>An important attribute of a data object is its data range. Many modules use it for their initialization. In addition, some components such as the <i>Segmentation Editor</i>, the <i>MultiPlanar Viewer</i>, and the new <i>PortColormap</i> (see below) use a histogram of the data. Previously, the range and histogram were computed when they were requested for the first time. For large data sets this led to significant wait times.</p> <p>In Amira 5.4 both computations are performed in separate threads immediately after the data has completely been loaded or computed. The parts of Amira that only display range or histogram data for informational purposes have been adapted to work independently and incorporate the information when it is available. The user can continue working while histogram and range data are being computed.</p>
Fast surface and tube rendering	<p><b>Surfaces</b> SurfaceView has been accelerated by using modern hardware rendering techniques. On an NVIDIA graphics card of the latest generation typical performance gains are 40 to 70 times using draw style <i>shaded</i> with option <i>Vertex normals</i>. Performance increases of up to 30 times can be realized when <i>Triangle normals</i> and/or transparent rendering are enabled.</p> <p><b>Tubes</b> The rendering of <i>SpatialGraph</i> objects as tubes (see <i>SpatialGraphView</i> -&gt; <i>Segment style: tubes</i>) has been improved in speed and responsiveness. Changing the <i>Tube scale factor</i> is now instantaneous even for large <i>SpatialGraph</i> objects.</p> <p><b>Note:</b> Fast surface and tube rendering requires recent graphics hardware and also increases the graphics memory consumption. Amira offers a legacy mode for older hardware that can be enabled in <i>Edit/Preferences/Rendering</i>.</p>

## User Interface Components

### Colormap port

Whenever color maps are used to colorize objects, Amira's display modules use *PortColormap* to allow selection of color maps and adjustment of the data window. The usability of this GUI component has been enhanced. The new features include easy-to-use range sliders to set minimum and maximum of a data window and a histogram plot drawn over the color map indicating voxel intensity distribution. For more details please refer to the documentation of the port in the *User's Guide*.

The full functionality of the port is used in: *OrthoSlice*, *ObliqueSlice*, *Volren*, *Voltex*, *SurfaceView* and *Isosurface* (the *ColorField* connection port is connected to a data object), and *Colorwash*.



### OrthoSlice/ObliqueSlice

Option *Linear* in port *Mapping Type* has been removed. The modules will use the *Colormap* option in port *Mapping Type* with a gray color map by default.

### Pool

Some improvements for the Pool area have been implemented.

- Selections are now drawn in the native style of the operating system (e.g., on Windows the selection is a blue frame with semi-transparent blue content).
- When an object is dragged outside the visible area, the Pool automatically scrolls.
- The new *Re-Layout* button in the Macro Button area allows all icons in the Pool to be reorganized such that data icons (green) are positioned on the left side of the area, compute modules (red) in the middle, and display modules (yellow and orange) on the right.

### Application Skin

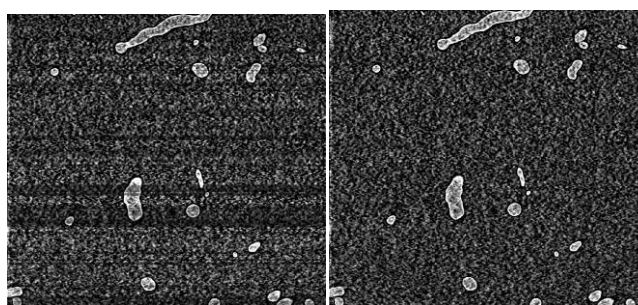
The skin has been reworked with a new color scheme. Buttons and progress bar are now drawn in the style of the respective operating system.

## New Modules

### *BlockFaceCorrection*

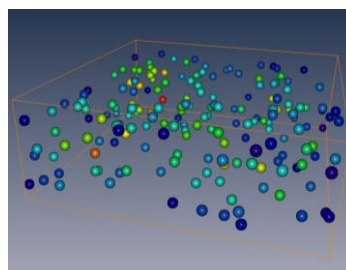
This module is useful for correcting inter-slice intensity variations that are typically found in block face scanning stacks. Using the *Segmentation Editor* the user defines regions of foreground and (optionally) background voxels on each slice.

*BlockFaceCorrection* generates corrected slices that have been calculated using the mean voxel intensity in the labeled regions.



### *ClusterDensity*

This module calculates the local density of vertices of a *Cluster* object. Depending on the size of the input object different algorithms can be selected. The result of the computation is a copy of the input cluster object with a new data column *Density* at each cluster point.



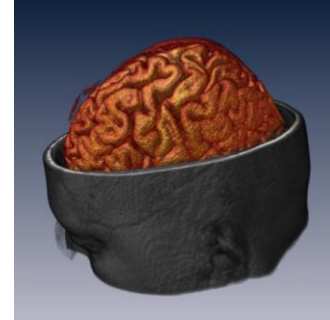
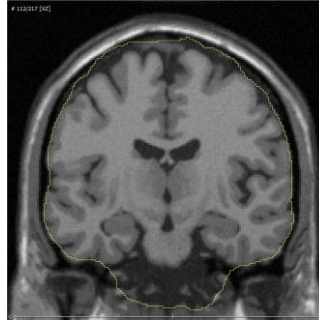
### *Filter Noise-Reduction-Non-Local-Means*

A new filter has been added to the *Image Filters* section that implements the windowed non-local means algorithm for noise reduction in scalar volume data. The non-local means algorithm very effectively removes white noise while naturally preserving most features present in the image, even small and thin ones.

The filter implements a CPU and a GPU version of the algorithm. The typically faster performing GPU version requires an NVIDIA graphics card with CUDA support. Thus, in order to take advantage of the fast implementation, make sure to install a display driver with CUDA support. On the Mac platform CUDA support is included with Mac OS X 10.6 (Snow Leopard) and higher.

### *SegmentBrain* (Neuro Option)

This module extracts a label field from T1/T2 weighted MR image data of the human skull in order to mask out non-brain tissue. Optionally, the module also exports a surface representation of the mask. Brain masks are useful for visualization and analysis.



## Improved Modules

### *DisplayISL/IlluminatedLines*

Both modules offer a new coloring mode *DEC* (Directionally Encoded Colors) that uses red, green, and blue primaries to encode the direction of the line segment at a given point where red, green, and blue denote the x-, y-, and z-directions respectively. The module *IlluminatedLines*, which historically has been part of the *Mesh Option*, is now available in the base package.

### *SpreadsheetFilter/SpreadSheetToCluster*

Some functionality in modules *SpreadsheetFilter* and *SpreadSheetToCluster* has been redistributed. The output options *BoundingBoxes* and *Tensors* of module *SpreadsheetFilter* have been moved into the *SpreadSheetToCluster* module. This rearrangement may lead to incompatibility with networks saved with previous versions of Amira. We apologize for any inconvenience.

### *ConnectedComponents*

To unify the results with module *MaterialStatistics*, the *CenterX*, *CenterY*, and *CenterZ* columns in the output of *ConnectedComponents* now denote the center of gravity of each region. Another set of three columns, *BBoxCenterX*, *BBoxCenterY*, *BBoxCenterZ* provide the center of the bounding boxes of the regions.

## Filament Editor (Microscopy Option)

### Improved line rendering in *2D Viewer*

Using modern graphics hardware, lines in the *2D Viewer* (2D) are rendered as 3D tubes intersecting the viewer plane. This has the important advantage that width of lines and diameters of nodes scale with the zoom of the 2D viewer. The new rendering requires relatively new hardware. If the graphics card does not support the new rendering, the previous rendering method is used.

Node-Segment Stepping Tool	A new item in the Tool Box allows stepping along the points of a segment while the 2D viewer shows the image data tangential to the line at the selected point.
3D graph smoothing	The graph can now be smoothed independently in the x-, y-, and z-directions.
Reorganization of the Tool Box	There are now three tools in the Tool Box labeled <i>View</i> , <i>Trace</i> , and <i>Edit</i> . <i>View</i> hosts all settings regarding the 2D and 3D viewers, <i>Trace</i> those of interactive and automatic tracers, and <i>Edit</i> the graph and loop detector as well as the new smoothing and edge stepper tools.

## Quantification+ Option

Upgrade to version 6.9.2.8 of the Visilog library	This version has many new features, including measures for porosity, tortuosity, and fractal dimension.
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## Miscellaneous

Snapshot tool	The snapshot tool has been thoroughly revised. It now provides anti-aliasing both for on- and off-screen modes. Also, viewer gadgets such as <i>Compass</i> and <i>Camera Track Ball</i> are automatically hidden when taking the snapshot. If the <i>Compass</i> is needed in the snapshot, a new module <i>CompassPosition</i> has been developed that can be used to add a compass to the snapshot.
New crash handler	In the rare occasion of a crash, Amira now gives the user the opportunity to save the current network.
TIFF reader for FEI-TIFF files	FEI FIB-SEM microscopes store acquisition parameters in private tags of the TIFF header. The reader can interpret these tags to correct y-axis foreshortening.
New tutorial on multi-component analysis	Counting and measuring multiple similar objects in an image stack is a frequently occurring task. A new tutorial accessible from the <i>Tutorials</i> page of the <i>User's Guide</i> explains the usage of dedicated modules, e.g. <i>LocalThreshold</i> , <i>ConnectedComponents</i> , <i>ShapeAnalysis</i> , <i>SpreadsheetFilter</i> .
Qt files added	The <i>Developer Option</i> now comes with Qt headers and libraries (LGPL license). This allows the user to use Qt in custom-projects.
New demos on multi-component analysis	The multi-component analysis tutorial is accompanied by a set of demo networks that can be launched from the <i>User's Guide Demo</i> section.



New demo on small animal imaging	A new demo in the <i>Demo</i> section of the <i>User's Guide</i> has been added showing an example from small animal imaging.
New performance logging	Performance logging collects information about Amira's usage and how individual operations perform. The information is anonymized and the user can disable performance logging at any time. From time to time Amira connects to a VSG logging server to which logged information is sent for evaluation. By default, the user is asked each time whether to allow the transmission of performance information.  This information is used to identify performance bottlenecks and allow us to focus development more specifically to our users' needs.
<i>Tree View</i>	The <i>Tree View</i> interface to the current network is disabled by default.

## Bug Fixes

Besides adding new features and improvements, we have spent great effort in fixing issues and bugs. The following section presents a selection of those issues.

Large data issues	Several issues regarding large data (i.e. data with more than 2 or 4 billion voxels) have been fixed.
<i>Quantification+</i>	The Microsoft Visual Studio runtime libraries for the <i>Quantification+ Option</i> were not explicitly installed, so on some systems the <i>Quantification</i> module did not work. Now the necessary libraries are installed during program setup.  <i>LabelFields</i> with two materials could not be used with <i>Quantification</i> filters that require a <i>Binary</i> data type. Performance has been improved for many operations.
Tcl interface	Module <i>Measurement</i> has now a command to query the results of a measurement.  In module <i>PointProbe</i> the command to get the sampled value ( <code>getSampledValue</code> ) has been unified with the other <i>*Probe</i> modules.  Tcl command <code>clock format</code> failed on 64-bit Windows.  Tcl command <code>newPortFilename</code> now has a new option to select directories.
Save network dialog	When unsaved data need to be saved, choosing <i>Save...</i> created an empty directory <code>&lt;network&gt;-files</code> .  When networks were saved in <i>Pack&amp;Go</i> format, data objects were saved as <i>AmiraMesh</i> but not renamed with suffix <code>.am</code> .

<i>SpreadSheet</i>	<p>When the <i>Show</i> button of a <i>SpreadSheet</i> object was pressed, the initial ordering of the rows was incorrect.</p> <p>The Microsoft Office XML export for spreadsheets was broken.</p> <p>Copy and paste from spreadsheets did not consider localized settings, e.g., the type of decimal mark on the current system.</p> <p>Copy and paste functionality was incorrect for reordered spreadsheets.</p>
<i>CalculusMatlab</i>	<p>Error messages on the Mac were incorrect.</p> <p>The documentation on how to setup Matlab to work with Amira's <i>CalculusMatlab</i> module was incomplete.</p> <p>The first output of Matlab command 'disp' was truncated.</p>
Miscellaneous	<p>MRC files with 8-bit precision were incorrectly read as unsigned byte.</p> <p>The sorting of filenames in the File/Open Data ... dialog did not follow common operating system standards. In particular, numbers in the beginning of filenames were not considered during sorting.</p> <p>When saving a surface object containing unused points, Amira will ask the user if the unused points should be removed. If the user answered yes and the surface was currently visualized with <i>SurfaceView</i>, the surface display could be corrupted or Amira could crash.</p> <p>In <i>SpatialGraph</i> data objects, the info ports <i>Vertices</i> and <i>Edges</i> have been renamed to <i>Nodes</i> and <i>Segments</i> in order to avoid confusion with computer graphics primitives and to reflect their usage in the <i>Filament Editor</i> documentation.</p> <p>Modules <i>VolumeEdit</i>, <i>SampleScalarField</i>, and the <i>Filament Editor</i> did not consider transformations of the input object(s).</p> <p>Reading multiple 3D TIFF stacks at once did not work properly. Only the first of the stacks was loaded.</p> <p>In module <i>Annotation</i> the font size can now also be changed on Linux and Mac.</p> <p>Some DICOMDIR files caused a crash when Amira attempted to load them.</p> <p>Module <i>Resample</i> produced wrong results when the target voxel size was exactly 2 times the source voxel size and the <i>Box</i> filter was used.</p>

## Maintenance Release 5.4.1

The maintenance release 5.4.1 provides various enhancements and solutions to known problems including the following:

Segmentation Editor	<p>It is now possible to pick regions in a rendering within the 3D viewer while the (empty) colored frames are in front of the rendering.</p> <p>No lag during creation of new materials when multiple materials are present in the material list.</p>
Multiplanar Viewer	<p>Enabled histogram range text fields for the <i>Correlation</i> metric in the <i>Auto Registration Tool</i>.</p> <p>2D mode is working again.</p> <p>The maximum range of the sliders in the <i>2D/3D Settings</i> color map controls now changes with different selections in the <i>Primary Data</i> pull-down menu.</p>
Neuro Option	<p>The DICOM reader now supports DICOM tags “0018:9087 <i>Diffusion B-Value</i>” and “0018:9089 <i>Diffusion Gradient Orientation</i>”. This enables sorting of DTI images into separate gradient volumes using the DICOM Loader dialog:</p> <ol style="list-style-type: none"> <li>1. Select from menu entry <i>Columns</i> item <i>Add columns...</i> Find the tag named 0018:9089 Diffusion Gradient Orientation and click <i>Add</i>.</li> <li>2. Drag the <i>Diffusion Gradient Orientation</i> column into the second position after the image stack column.</li> </ol>
Mac platform	<p>On Mac OS X with Nvidia graphics, <i>Volren</i> now displays high-resolution renderings for volumes with dimensions greater than 256 in the y-direction correctly.</p> <p>The mouse scroll wheel and the touch pad equivalent gesture for Apple hardware now works correctly on Mac OS X.</p> <p><i>SplineProbe</i> now updates the spline immediately after a control point is removed.</p>
Developer Option	<p>Users can now write version-dependent code. The new <i>defines</i> are documented in the Developer’s Guide.</p>
Miscellaneous	<p>The <i>Scale</i> module again displays labels at the ticks when <i>Text</i> is checked in the <i>Ticks</i> port.</p> <p>On Mac OS X and Windows XP x64 the mechanism to detect the number of CPUs and cores is now working correctly.</p> <p>Playback of single channel time series read from a Zeiss LSM is working again.</p> <p>Cylinders in <i>TensorDisplay</i> are now correctly displayed.</p>

*SpreadsheetToCluster* now calculates correct values for the tensor columns in *distribution* mode.

In the *File* dialog, items can now be sorted according to date.

Response time of *SurfaceGen* attached to large data objects has been improved for parameter changes in the *Properties Area*.

Networks with differential clipping, i.e., where clipping only applies to a subset of modules in the scene, are now saved correctly. When these networks are reloaded, only the intended objects are clipped.

*SurfaceView* now displays large surfaces by default with *Vertex normals* enabled (see *Draw style -> more options* in *SurfaceView*). The threshold size is set to 256 MByte which corresponds to about 7.5 Million triangles.

Fix of a bug that caused *Isosurface* to generate open surfaces of some double precision floating point fields *that should have been* closed.

*ApplyTransform* now uses the interpolation method indicated in the port *Interpolation* when used with *LabelFields*.

It is again possible to save networks containing *CameraRotate* or *Time* objects in *Pack & Go* format without Amira crashing.

## Maintenance Release 5.4.2

The maintenance release 5.4.2 provides various enhancements and solutions to known problems including the following:

Developer Option	An issue concerning an incorrect path was solved in the Development Wizard.
Mesh Option	The stability of the Fluent import filter was improved.
Quantification+ Option	This option is now available in a separate installer package.

## Maintenance Release 5.4.3

The maintenance release 5.4.3 provides various changes and bug fixes:

End User License Agreement (EULA)	Amira® is now owned by the Visualization Sciences Group (VSG). The EULA has been changed to reflect the new status of ownership.
Module <i>AlignSlices</i>	The <i>AlignSlices</i> module has been changed to save the correct transformation values for each slice. Existing alignments can be edited or used as reference to align another image stack (e.g., another channel).
Large surface issues	The generation of large surfaces has been optimized to not be affected by the number of slices and threads when multi-threading is enabled.
TIFF import with Tcl	TIFF image stack loading via Tcl has been improved to be unaffected by the number (odd or even) of slices.
Side-by-side stereo with <i>Volren</i>	Data visualization using <i>Volren</i> has been improved to render correctly in stereo modes Vertical Half [Filled] Screen and Horizontal Half [Filled] Screen.
Data loading and saving	BSpline data objects can be saved on Mac OS X. SurfacePathSet data objects in an Amira network can be loaded.
<i>Demo Director</i>	For compatibility, sorting of events with identical start times in the <i>Demo Director</i> has been changed to the legacy sorting used in the <i>DemoMaker</i> module.

## Maintenance Release 5.4.4

The maintenance release 5.4.4 includes various changes and bug fixes:

Merging the Microscopy Option with Amira base	<p>Most of the functionality belonging to the Microscopy Option is now licensed with a base Amira license. This affects the following components:</p> <p>Modules: Deconvolution modules (<i>BeadExtract</i>, <i>Convolution</i>, <i>CorrectZDrop</i>, <i>DataPreprocess</i>, <i>Deconvolution</i>, <i>DistanceMap</i>, <i>FourierTransform</i>, <i>PSFGen</i>)</p> <p>File formats: Leica (LIF, LEI, .info, 3dTIFF), Zeiss LSM, Olympus oib/oif; Biorad Confocal, MRC</p>
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Editors: Filament Editor.

- New Multi-Component Analysis Option**
- A new option is now available dedicated to the quantitative analysis of multiple similar items in a 3D image stack. The new Multi-Component Analysis Option consists of a number of modules and a tutorial. The modules are (the former Option in parentheses): *MorphologicalSeparation* (Amira Microscopy), *LocalThreshold* (Amira Microscopy), *ShapeAnalysis* (Amira Microscopy), *WatershedSegmentation* (Amira Microscopy), *ClusterDensity* (Amira), *SpreadSheetToCluster* (Amira), *SpreadSheetFilter* (Amira), *FilterBySpreadSheet* (Amira).
- Bug fixes**
- An index offset in the output of *ConnectedComponents* has been corrected.
  - Virtual Reality Option:
    - Visualizations with module *Volren* are now correctly rendered for both eyes in a VR configuration using stereo.
    - The mouse cursor is no longer seen on slave nodes in a VR cluster configuration.

## Maintenance Release 5.4.5

The maintenance release 5.4.5 includes only licensing bug fixes.

## Technical Information

### Announcements

#### **End of support for Microsoft Visual Studio 2005/2008:**

The next major release of Amira will no longer support Microsoft Visual Studio 2005/2008 (VC++ 8/9). Microsoft Visual Studio 2010 (VC++ 10) will be supported instead.

#### **End of support for Mac OS X 32-bit:**

The next major release of Amira for Mac OS X will be 64-bit.

### Supported Platforms

**Windows** – Windows XP (SP3 or newer), Windows Vista, Windows 7, 32-bit and 64-bit editions

**Mac OS** – Mac OS X 10.6 (Snow Leopard), 10.7 (Lion). Amira runs as a 32-bit application.

**Linux** – Red Hat Enterprise Linux 5.5 for x86\_64 or compatible. The software may work on other distributions too, but it has not been tested and is not supported.

## Developer Option Requirements

### Windows

- XP/Vista/7, 32-bit: Microsoft Visual Studio 2005 (VC++ 8), with Visual Studio 2005 SP1
- XP/Vista/7, 64-bit: Microsoft Visual Studio 2008 (VC++ 9)

### Mac OS

- GCC 4.2.x for all supported versions of Mac OS X

### Linux

- RHEL 5.5: GCC 4.1.x

## Hardware Requirements

A CPU supporting SSE2 instruction set (Intel Pentium 4 and above or compatible). On Mac OS X an Intel CPU is required. *PowerPC processors are no longer supported.*

At least 2 GB RAM.

A graphics card with OpenGL support and hardware accelerated texture mapping. Some visualization modules require graphics hardware with the following vertex and fragment shader support:

GL\_ARB\_shader\_objects    GL\_ARB\_shading\_language\_100  
GL\_ARB\_fragment\_shader    GL\_ARB\_vertex\_shader

## Recommended Hardware

CPU: Multi-core CPU with  $\geq 2$  GHz

Main memory:  $\geq 4$  GB

Graphics card: A current desktop card from one of the main vendors (NVIDIA or ATI) with at least 512 MB video RAM. If OpenGL stereo support is needed (e.g., stereo projection or AmiraVR), an NVIDIA Quadro or an ATI FireGL / FirePro card with the appropriate driver must be installed.

## Installation Notes

**Windows runtimes installation** The installer for both Microsoft Windows distributions provides a mechanism to install the appropriate runtime libraries.

**License Manager** Due to security mechanisms in modern operating systems (e.g., Microsoft Windows User Account Control) Amira needs to run with administrator privileges in order to be able to change the license file. When Amira is launched at the end of the installation procedure this is automatically the case so that saving the license file from within the License Manager is possible. For all subsequent changes of the license file, Amira needs to be explicitly started with administrator privileges (Right-click the Amira icon, select "Run as administrator" from the context menu).

**Note:** Some virus scanner software can significantly slow down installation. If you observe stalling during installation, this is likely to be caused by a virus scanner program. Turning off the virus scanner when installing Amira usually solves the issue.

## Manufacturer Information

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