Software

# Release notes

## Amira-Avizo2D Software version 2022.1

This document covers the most important new features, improvements, and changes in version 2022.1 of Thermo Scientific™ Amira-Avizo2D Software.

In addition, you will find a list of new Xtras including video tutorials, recipes, and workflows which have been published on **https://xtras.amira-avizo.com** since the previous release.

We value your feedback. If you encounter any problems or have any suggestions for improvement, do not hesitate to contact us at **frbor.3d_info@thermofisher.com**.

# Contents

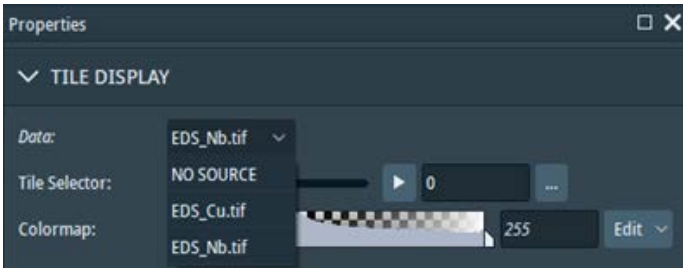
# New modules and features in Amira-Avizo2D Software

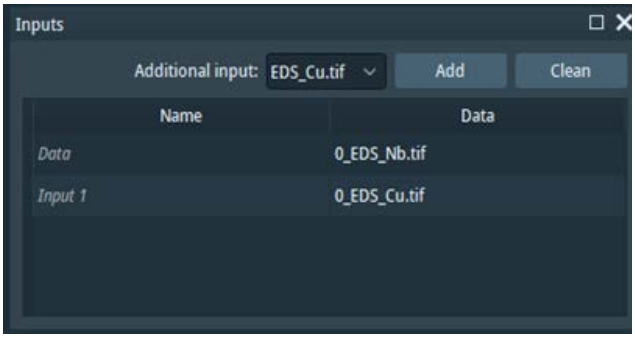
## Units selector in A2D Analyzer

You can now choose the units of the A2D Analyzer (previously units were µm by default). With this version, we have introduced a new menu, Options, with an entry Units to let you choose between µm and nm. Changing the units requires that no image be currently loaded. You can still change units while some data are already loaded, but that will remove all of them.

## Support of multiple inputs

It is now possible to load multiple images simultaneously. This allows you to create multi-input recipes to analyze multi-channel data such as Energy Dispersive X-Ray Spectroscopy (EDS) data when they are stored as single grayscale image files. Multi-input recipes require the different inputs to have the same dimensions.

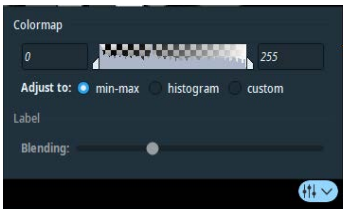



**Selecting among multiple datasets in the Main workroom, and adding additional datasets to the recipe in the ISP recipe creation workroom.**

## New control widget of the ISP viewer

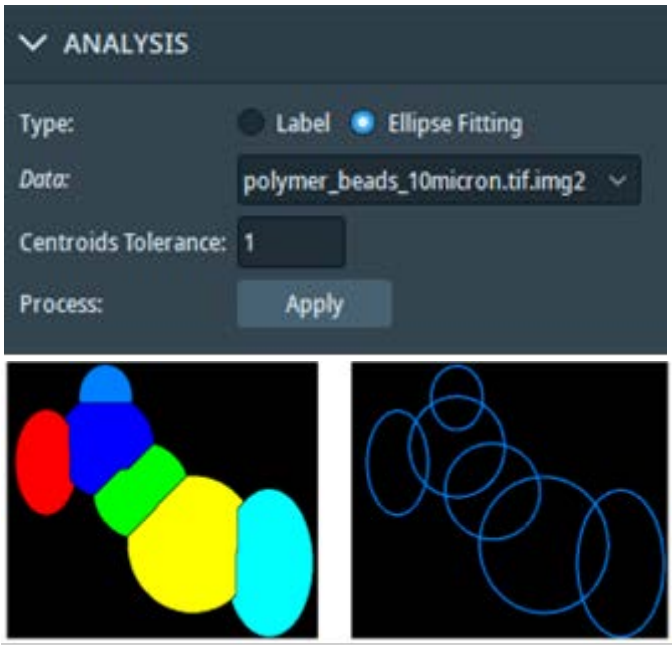
A control widget has been added to both viewers of the ISP workroom in A2D Analyzer. With it you can now select how the colormap is auto-adjusted for the viewer: min-max of the dataset (previous behavior of the viewer) or histogram. You can select a custom range too. The label blending slider has also been moved to this new control widget.




## Ellipse Fitting

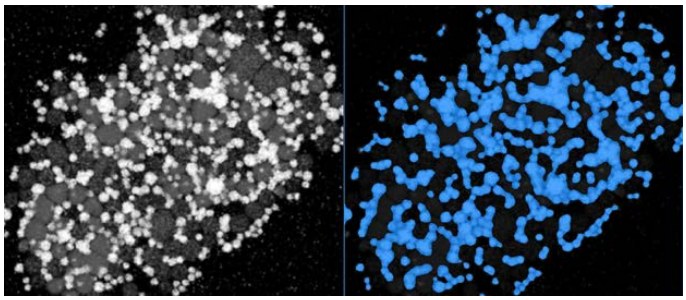
A new Ellipse Fitting analysis is available and can be selected in lieu of the Label Analysis. It requires a label image as input and fits an ellipse to each label. The output of the analysis is a binary image of all the ellipses, for visual validation, and a spreadsheet that contains the following statistics for all the ellipses:

- Center of the ellipse (x, y)
- Minor and major axis
- Angle of the ellipse



## Particle Detection

This new module segments particles in grayscale images. The algorithm relies on hysteresis thresholding and mathematical morphology to detect bright particles and filtering noise.



## Colocalization

This module produces a segmented image of the colocalized particles. Colocalized particles are particles that are overlapping. To do so, it will use two binary images as input, one for each particle. All particles that are not overlapping are discarded.

## Random-Walk Distance Map

A new module, “Random-Walk Distance Map,” is now available to help improve the segmentation of non-circular objects.

The “Random-Walk Distance Map” module computes a distance map from a binary segmentation. This map indicates, for each foreground pixel, the average time it takes for a random walk starting from this pixel to reach a background pixel. Compared with Euclidean or Chamfer distance maps, this module is less affected by noise in the segmentation or objects of anisotropic shapes.

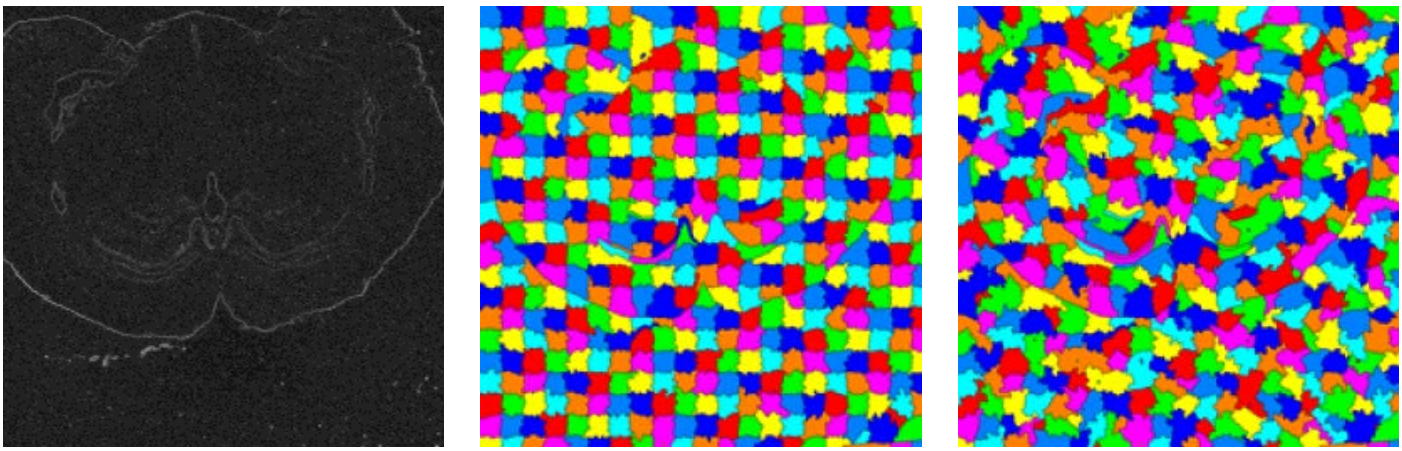
This new module is particularly well-suited for object separation workflows in the case of non-circular objects and/or noisy segmentation data.

## New Module: Waterpixels

The new module “Waterpixels” is a particular implementation of superpixels, which partitions the input image into regions of homogeneous sizes and which follows the image’s contour.

The implementation is inspired by the following publication: *V. Machairas, E. Decenciere, T. Walter. “Waterpixels: Superpixels based on the watershed transformation,” IEEE International Conference On Image Processing, Paris, France, Oct. 2014.* **https://doi.org/10.1109/ICIP.2014.7025882**

The module can accept grayscale or RGB images. It computes 2D waterpixels for a 2D image. An option allows you to automatically compute the gradient magnitude – on the luminance in the case of RGB input data.



a b c

**Superpixel generation with the waterpixel algorithm: (a) Input image given by a morphological gradient, (b) waterpixels emphasizing the regular grid (high regularization factor), (c) waterpixels emphasizing the input image (low regularization factor).**

# Enhancements

## Deep Learning Prediction

The module “Deep Learning Prediction” has a manual tiling mode, which may be required in situations where the available GPU memory and requirements are not accurately estimated. It is now also possible to adjust the number of pixels of overlap between adjacent tiles. Reducing this overlap will reduce the GPU memory requirements and the computation time. However, artefacts at the boundaries between tiles may appear, especially when the model is not able to generalize accurately.

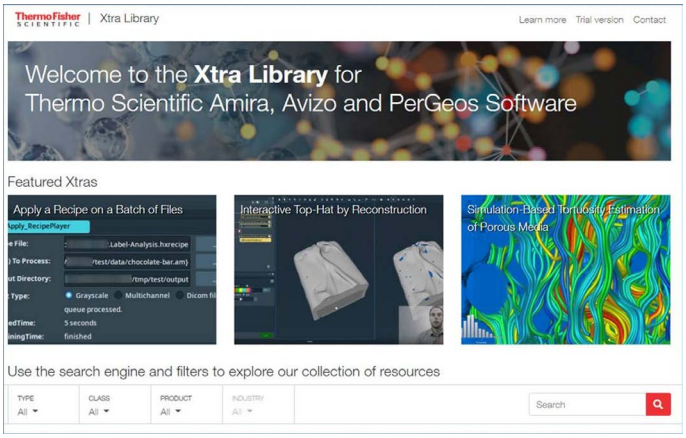
Nevertheless, the automatic tiling mode will remain sufficient in most cases.

## Python interpreter - Multithreading and multiprocessing support

This version adds support for multithreading and multiprocessing for Python scripts. Refer to the user’s guide Multiprocessing/ Multithreading section for details and code snippets.

# Xtra Recipe Library

The following Xtras have been published or updated since the previous release notes. Pay particular attention to the product, license and OS requirements, as well as the installation instructions. Your feedback is welcome.




**BSE SEM denoiser** – Deep Learning Model (Update): U-Net model for denoising back-scattered SEM images.

**How to use deep learning models in Amira-Avizo2D Analyzer (Update):** Examples show how to use AI (deep learning models) in an Analyzer recipe (hxisp).

**How to Create a Particles Segmentation Recipe in Avizo2D Software using its ISP Workroom:** This tutorial demonstrates how to use the ISP workroom in Avizo2D software to create and run a recipe for particles segmentation.

# Operating systems

Amira-Avizo2D Software version 2022.1 runs on: Microsoft® Windows ™ 10 (64-bit).

# Solved issues

| Name | ID | Description |
|---|---|---|
| Thermo Scientific License Manager | LM-191 | Offline upgrade only supported upgrading from x to x+1 version. Offline upgrade now supports upgrading to any version. |
| Thermo Scientific License Manager | LM-116 | Offline activation would fail when activating more than 5 licenses at a time. This has been fixed. |
| Thermo Scientific License Manager | LM-174 | Licenses upgrade could fail on machines connected to the internet via a Proxy server. TLM can now be configured with proxy settings and the documentation has been updated consequently. |
| Thermo Scientific License Manager | LM-173 | When trying to activate, upgrade, deactivate or reactivate a license, an error could occur if the firewall was not configured to allow the connection to TLM portal server. TLM documentation has been updated to document how to configure your firewall. |

Thermo Scientific License Manager has been updated to improve offline operations, make sure you don’t skip Thermo Scientific License Manager 1.6.7 installation at the end of Amira-Avizo2D Software installation to benefit from those fixes.

Learn more at **thermofisher.com/avizo2D**

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