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I. INTRODUCTION

Daybook Analysis is primarily the companion software of Argolight hardware products. It allows to quickly and easily analyze images of the Argolight geometrical patterns acquired with a fluorescence microscope. Thanks to dedicated image analysis algorithms, Daybook Analysis provides quality data and performance metrics about the controlled microscope, organized in images, graphs and tables.

Besides, Daybook Analysis can also analyze images of non-Argolight products to provide the complementary quality data that are not accessible with Argolight hardware products.

Notably, Daybook Analysis meets almost all the guidelines of the recently published ISO 21073-2019 norm (<https://www.iso.org/standard/69820.html>), about performance assessment of fluorescence confocal laser-scanning microscopes for biological imaging.



II. STARTING PROCEDURE

When launching Daybook Analysis for the first time, the “Settings panel” appears (cf. Figure 1).

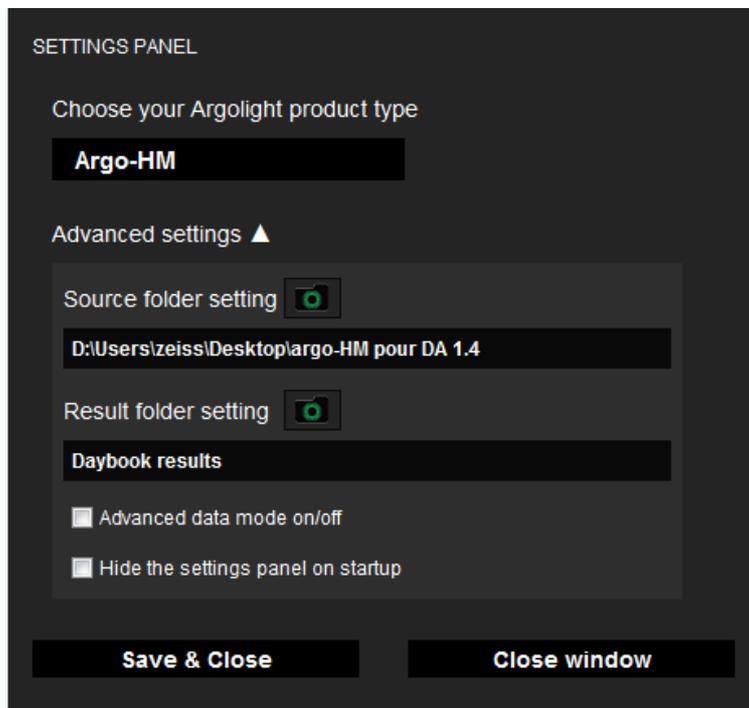


Figure 1: Settings panel, with the “Advanced settings” displayed.

Is possible to come back to the settings panel at any time: click on the “Settings” button in the menu at the bottom left-hand corner. (cf. Figure 2)



Figure 2: Settings button, at the bottom left-hand corner.

Choose your product type:





Enter the type of Argolight product you are using:

- Argo-POWER^{HM}
- Argo-POWER^{SIM}
- Argo-POWER^{LM}
- Argo-HM
- Argo-SIM
- Argo-LM
- Argo-WP
- Argo-Check Resolution
- Argo-Check Intensity
- Argo-Check Homogeneity
- Argo-Z

Enter the type of non-Argolight product you are using:

- Point-like object

Prior generations of Argolight products (such as the Argo-M) are not compatible with Daybook Analysis.

Each type of product displays different patterns, that's why it is essential to select the correct type before running any analysis. Otherwise, the analysis would provide wrong results.

Advanced settings:

- Source folder setting:

Define the folder where the images to analyze are located.

- Result folder setting:

Define the folder where the results files (images, spreadsheets...) will be saved.

- Advanced data mode on/off:

Access to more images, such as raw images, and data in the saved results files. We advise not to check this option for routine usage.

- Hide the settings panel on startup:

Prevents the settings panel to appear each time Daybook Analysis starts.



III. ACCEPTED IMAGE FILE FORMATS

Daybook Analysis can process up to 150 different image file formats, thanks to the integration of the well-known Bio-Formats library.

The list of the formats that can be read by the Bio-Formats library is available here:

<https://www.openmicroscopy.org/site/support/bio-formats5.5/supported-formats.html>.

Note: IMS files (from Andor Dragonfly systems) will open in the smallest resolution. It is recommended to save IMS files into OME.TIFF files, as this will retain some of the scaling information and metadata, while still being readable through Daybook Analysis.

Although 8-bits images are accepted, 16-bits images are recommended as they allow a more accurate processing.

32-bits images can be uploaded, but they cannot be analyzed, as they may contain negative values.

Single color images can be uploaded, but they are converted into greyscale images.

Multicolor (RGB) images can be uploaded, but they are not suited to be analyzed.

Paths and names of the image source files can contain accents. Some special characters are not accepted.

Note: To prevent data losses, we do recommend saving the source images either:

- in a proprietary format (e.g. Leica LIF, Nikon ND2, Olympus OIR, Zeiss CZI, etc.),
- in a compressed but lossless format (e.g. lossless TIFF).

Do not save images in compressed but lossy formats such as JPEG. Indeed, this form of compression can alter the intensity data in the images in a non-linear fashion, leading to unpredictable biases in intensity measurements.



IV. UPLOAD IMAGES

Daybook Analysis can upload and store source images in order to re-use them from one session to the next one. To start an analysis session, click on “Analysis” (on the top left of the window, cf. Figure 3).

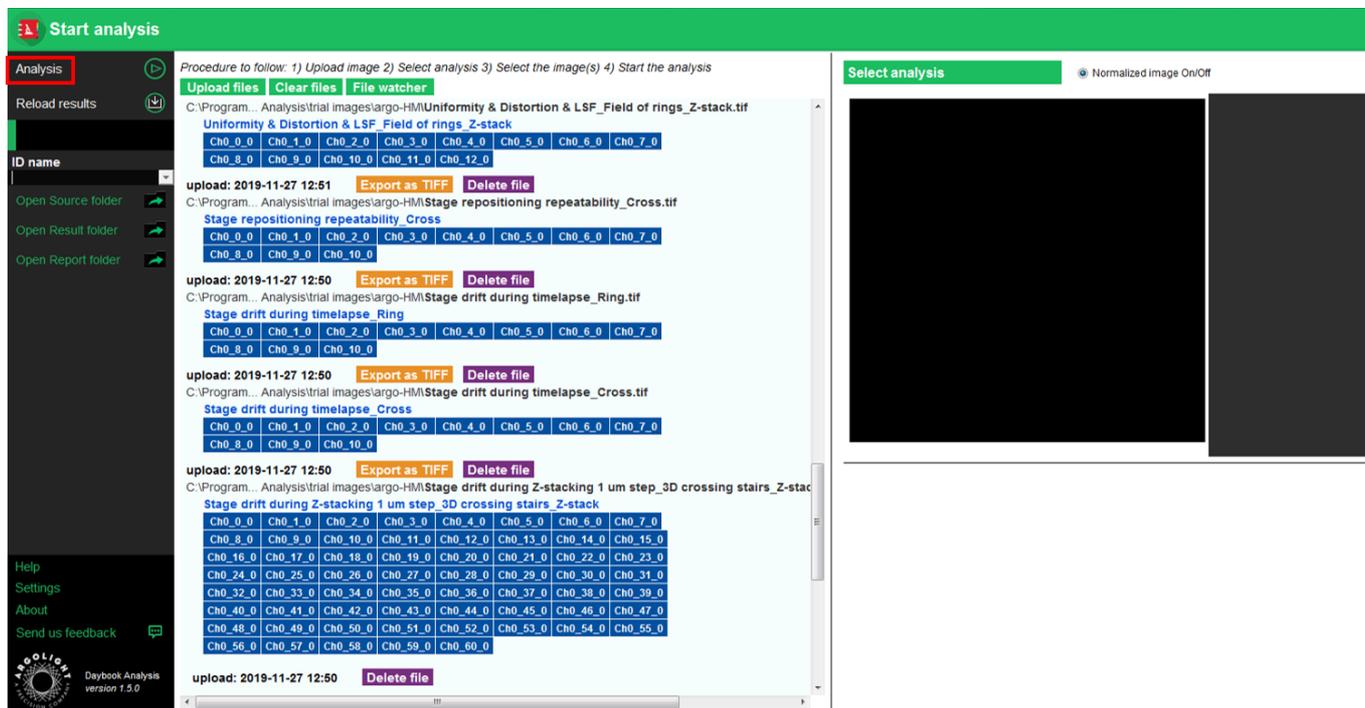


Figure 3: Analysis session window.

Image examples acquired following the acquisition recommendations described in the documentation of each analysis can be downloaded from the Daybook Launcher interface, as shown in Figure 4. We encourage you to process these images to have an idea of the image quality required to perform the analysis, and to start being familiar with the use of the software.

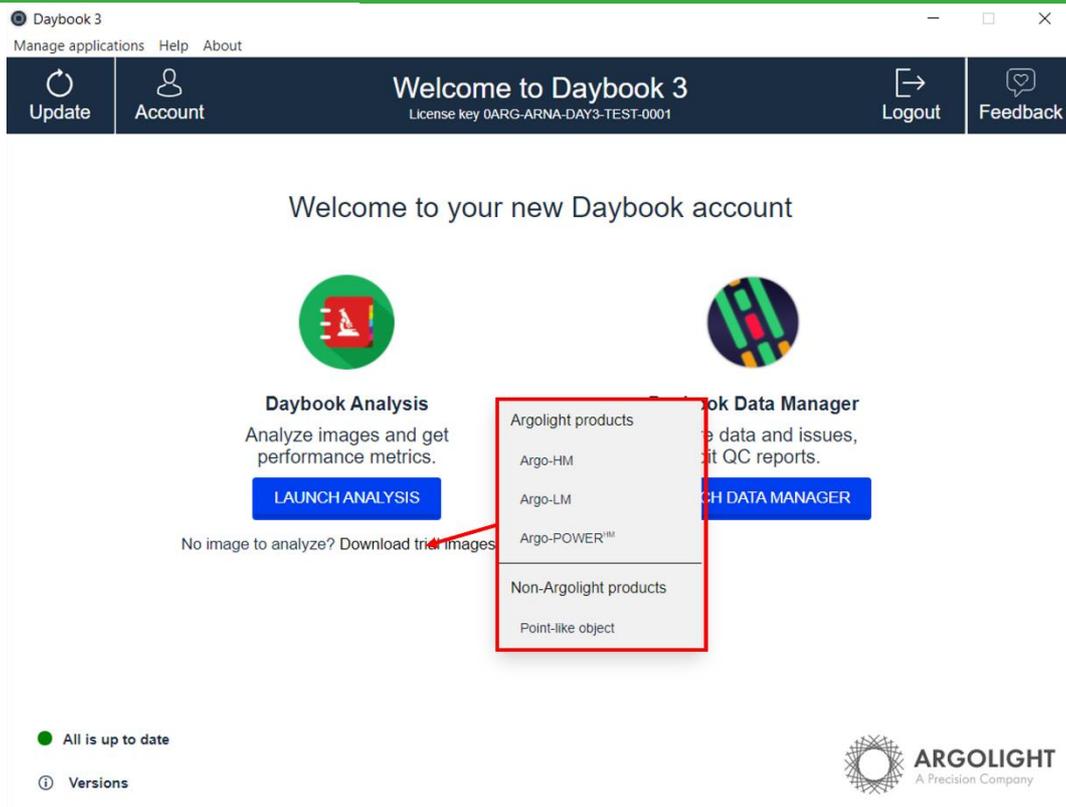


Figure 4: Daybook Launcher interface, from which it is possible to download trial images.

1. UPLOAD IMAGES MANUALLY

The “Upload file” button allows you to upload images, proprietary files or spectra text files (cf. Figure 5). Images can be Z-, T-, and multi-channels stacks.

You can upload several files in one run.

Note: When dealing with Yokogawa CV7000 and CV8000 HCS/HTS imaging systems, select the MES file to load all the images at once.

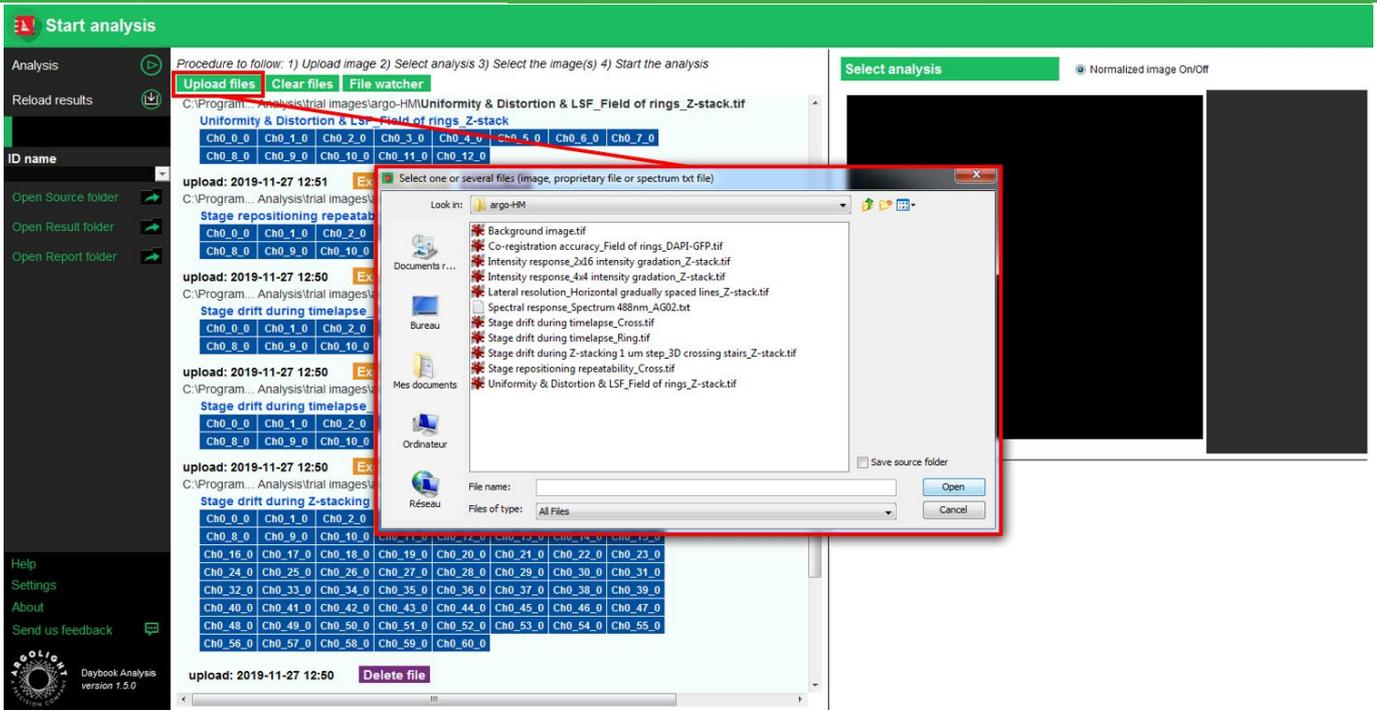


Figure 5: Manual upload of files.

Click on “Open”. The upload will start.

To save the source folder location, tick the “Save source folder” box (cf. Figure 6). You can also modify the default source folder in the “Settings panel”.

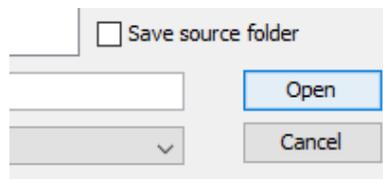


Figure 6: Save source folder.

2. UPLOAD IMAGES AUTOMATICALLY

The “File watcher” button allows you to automatically upload files that are added to a specific watched directory (cf. Figure 7). The watched directory is the source folder, defined in the “Advanced settings” of the “Setting panel”.

This feature can be useful to upload in Daybook Analysis images acquired from a microscope as soon as they are saved in a directory.

When the automatic upload is enabled, the button turns blue and the text becomes “File watcher ON”.

When the automatic upload is disabled, the button turns green and the text becomes “File watcher OFF”.

Note that if the name of an image file within the watched directory is modified, then the image file will be considered as a new file and automatically uploaded in Daybook Analysis.

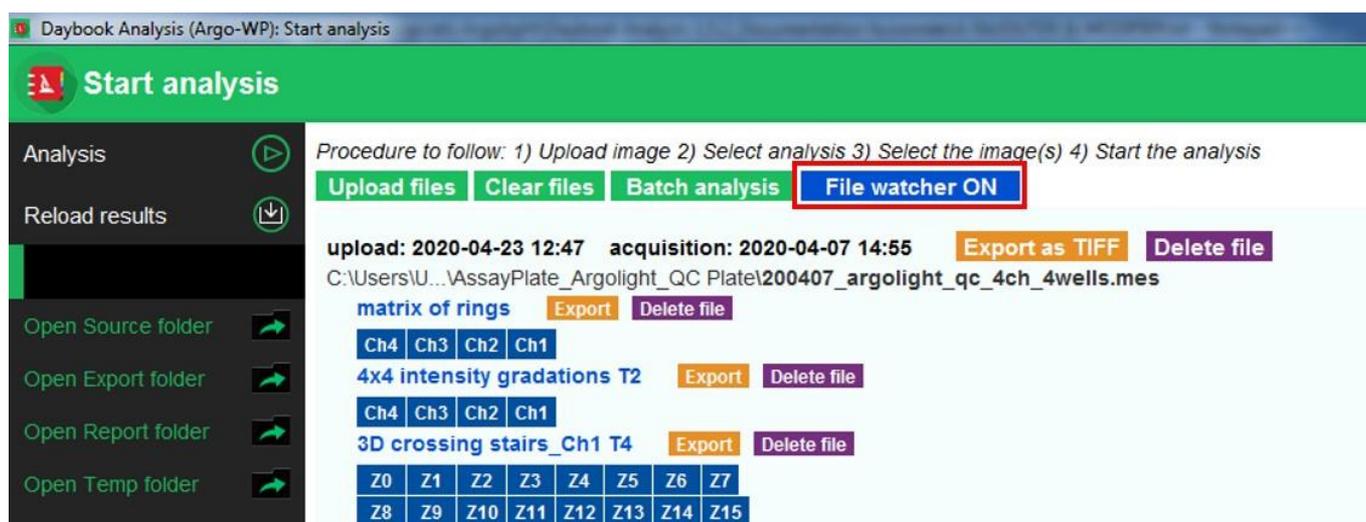


Figure 7: Automatic upload of files.

In order to automatize even more the quality control process in the future, it is recommended to save the captured images in a file which name contains the name of the imaged pattern. Example: "2020_01_21_Argo-HM_Field of rings_40x_DAPI-GFP-TexasRed_Z-Stack".

Note: After some time, if no activity is detected in the watched folder, the "File watcher" is switched off. If this happens, click twice on the "File watcher" button to turn it on again.

3. CLEAR & SAVE IMAGES

- "Clear files":

The "Clear files" button can be used to clear all the files in the analysis session.

- "Export as TIFF":

The "Export as tiff" button can be used to convert a proprietary image (such as CZI, LIF, etc.) into a TIFF format, more easily usable. Note that this action may modify the detector bit depth.

- "Delete file":

The "Delete file" button can be used to delete a single file in the analysis session.



V. RELOAD RESULTS

It is possible to reload and display again the results (maps, graphs, and tables) of a previous analysis saved into a CSV file, where they are stored with their relative path.
 If a results file is missing (for example, a map has been deleted from the result folder), the loading might fail or be incomplete.

a) Identify your results to a machine, lab, user, etc.

On the left-hand side menu, under profile name, type a name then 'enter' to create the profile (cf. Figure 8, left). To delete a profile, right click on the profile name (cf. Figure 8, right).

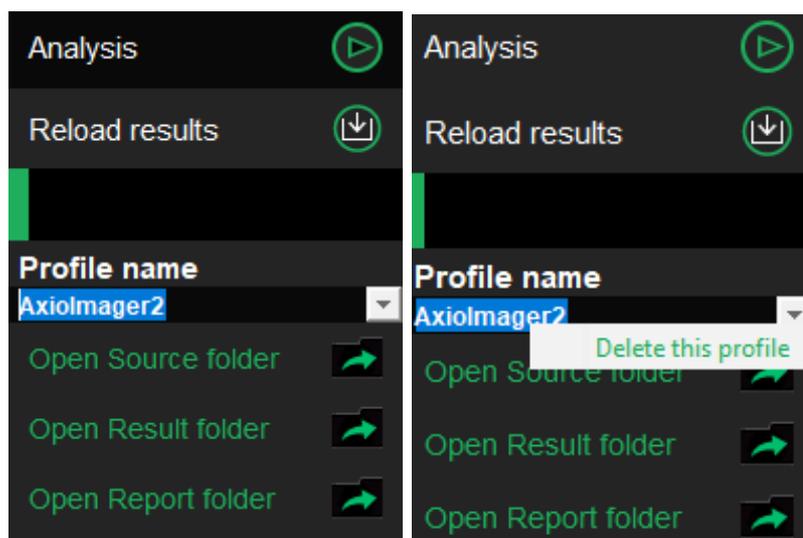


Figure 8: Left: Creating a profile; Right: deleting a profile.

This name will be noted in the saved results and added to the metadata in the saved results files (CSV) and to the result file name (cf. Figure 9).

You will thus be able to retrace your results to a specific identification name (user, lab, room, microscope, etc.).

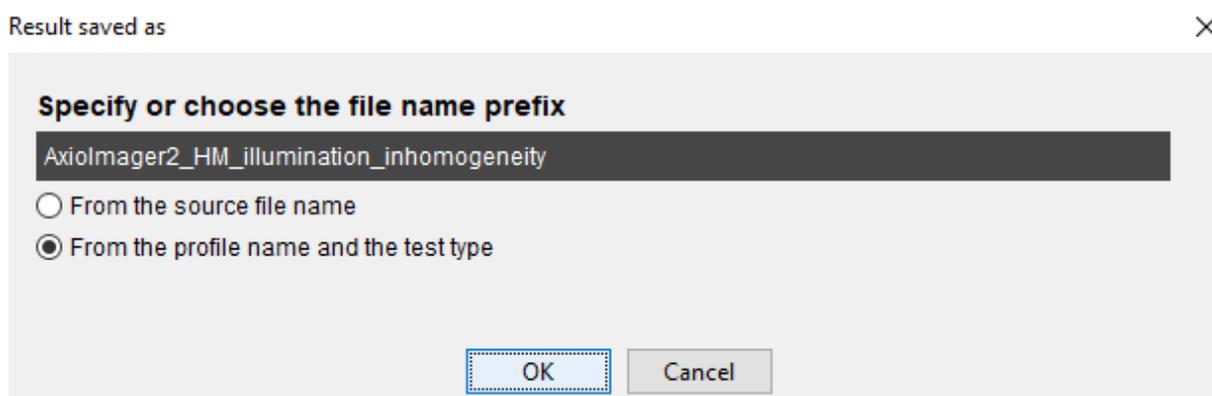


Figure 9: Choosing a name for the results file.



b) Reload Results

To reload results of a previous analysis, click on the “Reload results” button on the left-hand side and select a CSV file (cf. Figure 10).

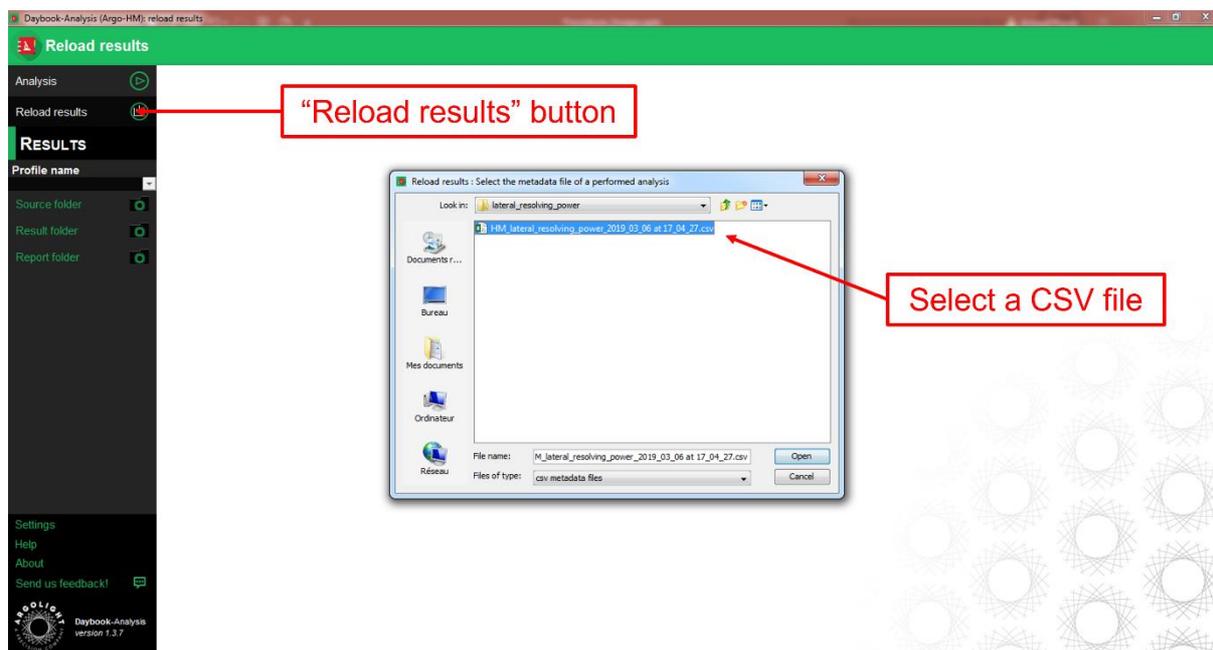


Figure 10: Reloading results when the database is disabled.

The reloading of the results works slightly differently depending on whether Daybook Data Manager is disabled or enabled.

1. RELOAD RESULTS WHEN DAYBOOK DATA MANAGER IS DISABLED

When Daybook Data Manager is disabled, either because you do not have an activated license or because you do not have an internet connection, the reloaded results page is similar as the regular results page, except the presence of the “Save results” button.

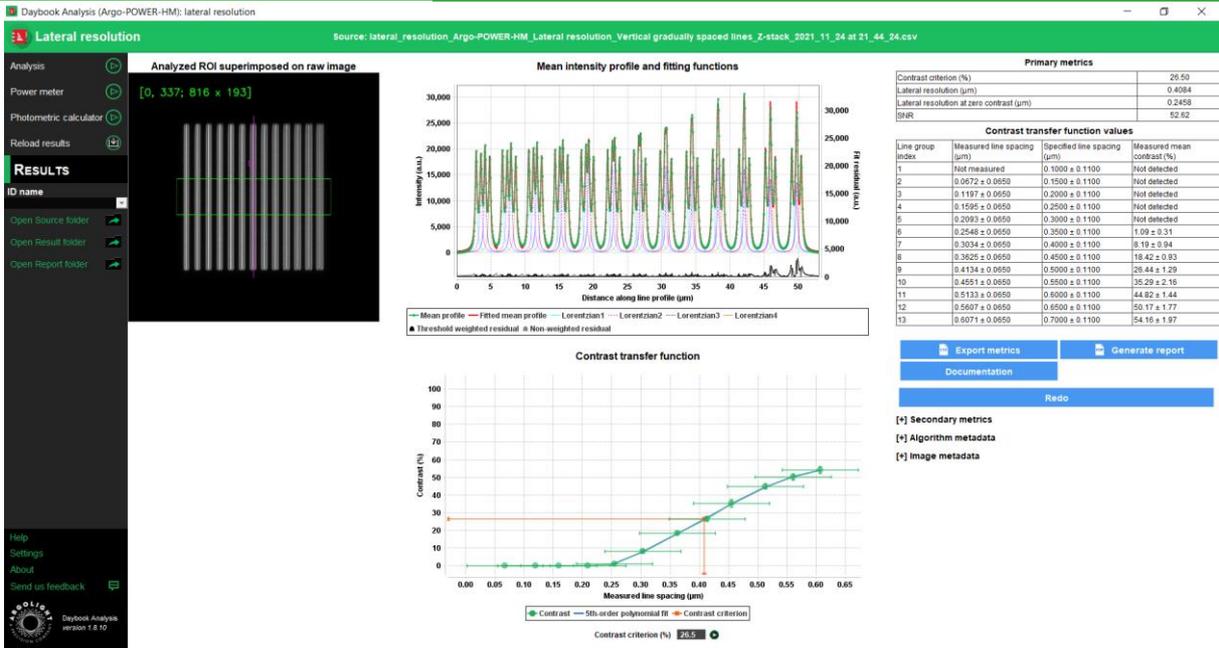


Figure 11: Reloaded results page when the database is disabled.

2. RELOAD RESULTS WHEN DAYBOOK DATA MANAGER IS ENABLED

When Daybook Data Manager is enabled, the reloaded results page is exactly the same as the regular results page, with the presence of the “Save in Data Manager” button.

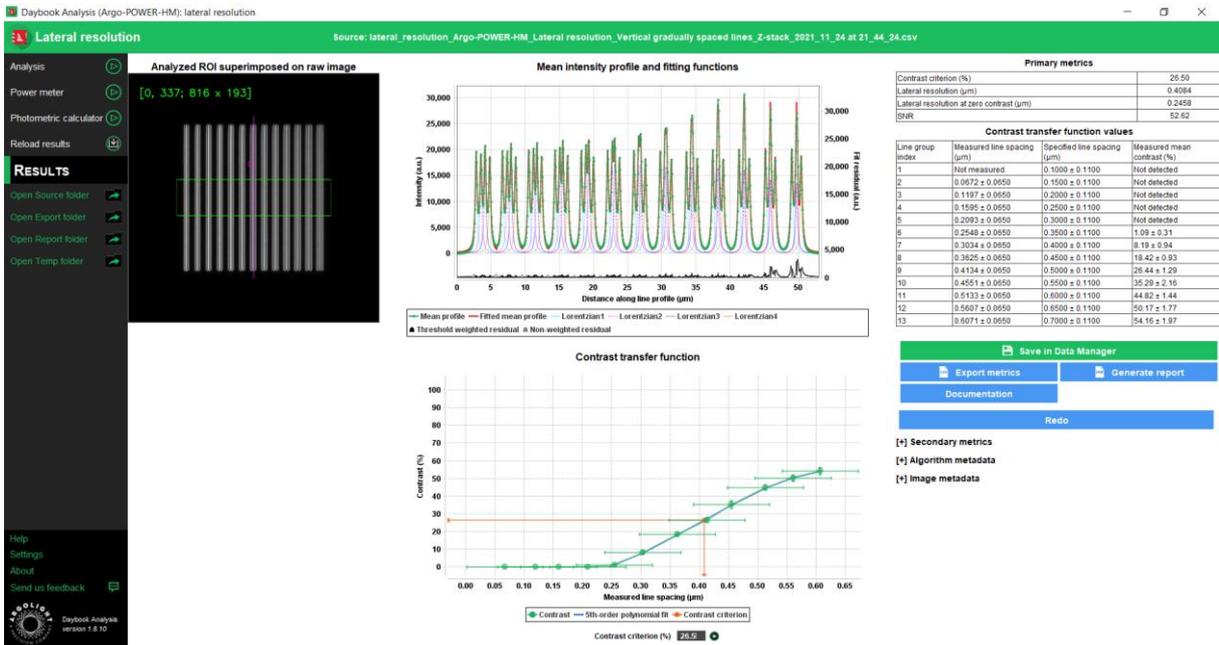


Figure 12: Reloaded results page when the database is enabled. Note that the “Save in Data Manager” button is available.

3. I HAVE GOTTEN RESULTS WHEN THE DATABASE WAS DISABLED. CAN I LOAD THEM INTO MY DATABASE?



It is possible to save results, that have been obtained from Daybook Analysis when Daybook Data Manager was not activated, in the database afterwards.

To save these results, reload them through the CSV results file, and click on the “Save in Data Manager” button in the results page. But remember that **at least one system, one acquisition profile and one channel must have been created previously in Daybook Data Manager.**





VI. PATTERN AND ANALYSIS CORRESPONDENCE

PATTERN FAMILY	PATTERN NAME	PATTERN DRAWING	ASSOCIATED ANALYSIS
A	Target		Spectral response
B	Field of rings		Field uniformity Field distortion Lateral co-registration accuracy Line spread function Ring spread function
C	4x4 intensity gradation		Intensity response
D	2x16 intensity gradation		Intensity response
E	Gradually spaced lines		Lateral resolution
F	Matrix of crosses		Optical sectioning strength
G	Sphere		Accuracy of 3D reconstruction
H	Repositioning crosses		Stage repositioning repeatability Stage drift during timelapse
I	3D crossing stairs		Stage drift during Z-stacking
J	Word ARGOLIGHT		Spectral response
K	3D matrix of rings		<i>Not yet available within Daybook Analysis</i>
L	Field of rings on a background		<i>Not yet available within Daybook Analysis</i>
M	Geometrical figures		<i>Not yet available within Daybook Analysis</i>
N	Grid		<i>Not yet available within Daybook Analysis</i>

Table 1: Pattern and analysis correspondence.



Table 1 presents the correspondence between the patterns and the available tests in Daybook Analysis.





VII. IMAGE ACQUISITION RECOMMENDATIONS FOR EACH PATTERN

PATTERN NAME	Z-STACK	MULTI-CHANNEL	TILES (OR SCENES)	T-STACK
Field of rings	Recommended but not mandatory	Mandatory only for the “lateral co-registration accuracy” analysis; recommended otherwise	No	No
4x4 Intensity gradation	Recommended but not mandatory	Recommended but not mandatory	No	No
2x16 intensity gradation	Recommended but not mandatory	Recommended but not mandatory	No	No
Gradually spaced lines	Recommended but not mandatory	Recommended but not mandatory	No	No
Matrix of crosses	Recommended but not mandatory	Recommended but not mandatory	No	No
Sphere	Yes	Not mandatory	No	No
Repositioning crosses	No	No	Yes (if no T-stack)	Yes (if no tiles nor scenes)
3D crossing stairs	Yes	No	No	No

Table 2: Image acquisition recommendations for each pattern.

Table 2 presents the image acquisition recommendations for each pattern so that the captured images are correctly and completely analyzed in Daybook Analysis.

VIII. SOFTWARE SETTING RECOMMENDATIONS FOR EACH ANALYSIS

ANALYSIS NAME	BACKGROUND SUBTRACTION	HOT PIXELS REMOVAL	BEST FOCUS SELECTION	INTENSITY PROJECTION
Field uniformity	Yes if the SBR is low	Yes if there are hot pixels	Recommended to consider the field curvature and/or the sample/stage tilt	Recommended to leave the field curvature and/or the sample/stage tilt aside
Field distortion	Yes if the SBR is low	Yes if there are hot pixels	Yes	NA
Lateral co-registration accuracy	Yes if the SBR is low	Yes if there are hot pixels	Yes	NA
Line spread function	Yes if the SBR is low	Yes if there are hot pixels	Yes	NA
Ring spread function	Yes if the SBR is low	Yes if there are hot pixels	Yes	NA
Lateral resolution	Yes if the SBR is low	Yes if there are hot pixels	Yes	NA
Optical sectioning strength	Yes if the SBR is low	Yes if there are hot pixels	Yes	NA
Stage repositioning repeatability	NA	NA	NA	NA
Stage drift during timelapse	NA	NA	NA	NA
Stage drift during Z-stacking	NA	NA	NA	NA
Accuracy of 3D reconstruction	NA	NA	NA	NA
Intensity response	Yes if the SBR is low	Yes if there are hot pixels	Recommended to consider the field curvature and/or the sample/stage tilt	Recommended to leave the field curvature and/or the sample/stage tilt aside
Spectral response	NA	NA	NA	NA

Table 3: Software setting recommendations for each analysis. SBR = Signal-to-Background Ratio. NA= Not Applicable.

Table 3 presents the software setting recommendations for each analysis so that the results provided by Daybook Analysis are meaningful.



Encountered an issue or a question when using Daybook Analysis?

Please send a screenshot and your problem description to:

customer@argolight.com