

Thomas Rutten Projects



EasyClus[®] software



Phytoplankton analysis by Flowcytometry and EasyClus[®] software

Phytoplankton particles are analyzed quickly by flow cytometric instruments in a laboratory or directly in the field (CytoSense—Sub). Flow cytometers measure thousands of algae in a few seconds to minutes and produce a lot of data, which need to be transformed to understandable information. This data analysis process is quite complex, needs experience and data computer skills and can take a lot of time due to the large amount of collected flowcytometric data. This is where EasyClus[®] software comes into the picture, and what it is intended for i.e., 'to guide and help flow cytometry users with the fast and effective processing of data,' and with the help of Thomas Rutten Projects.

What is EasyClus[®]?

EasyClus is a **software tool** to help you to get **organized results** of your flowcytometric data, especially CytoSense-Sub data, but also other instrument data (*data input in '.fcs', '.cyz', '.csv' format*). EasyClus runs in the basic version Matlab[®]. It will save you time compared to manual data processing. EasyClus users will get help from the developer directly by a personal approach to extract the data they need. EasyClus is used to :

- analyze data – cluster your particles/cell/algae data quickly into groups
- build libraries/ database and classify particles on basis of this database
- calculate counts, concentrations, mean/median lengths, biomass, biovolume
- standardize your data
- visualize your data
- check the instrument performance (only CytoSense-Sub)
- process in real time your analysis data & upload to a live website
- perform image analysis on images
- make reports on species types and/or groups
- SAVE you a lot of time

Look at this [introduction video of EasyClus](http://www.easyclus.com/videosEC/EasyClus_introduction_def.mp4) (www.easyclus.com/videosEC/EasyClus_introduction_def.mp4) in combination with a CytoSense (CytoBuoy.com) flowcytometer

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EC previous | **EC LIVE** | EasyClus Dashboard | v2.12-TRP 03-2023

Imported: D:\DATA_RWS\RWS-Eijsden data 2023\EU2_SWS15_FLRed10_auto_uls_phyto_600s 2023-10-11 00h02.cyz

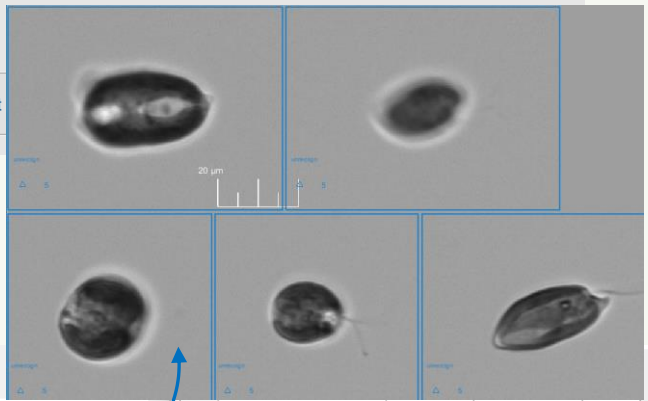
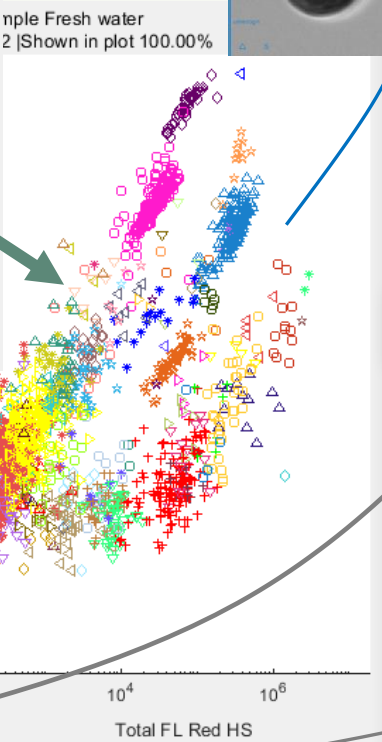
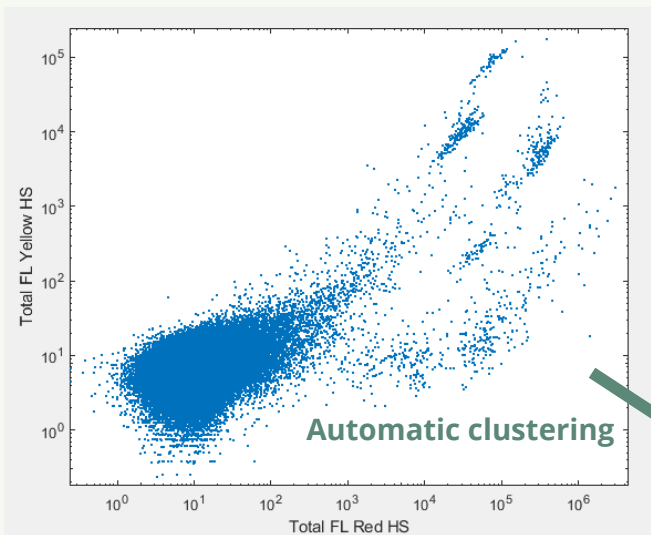
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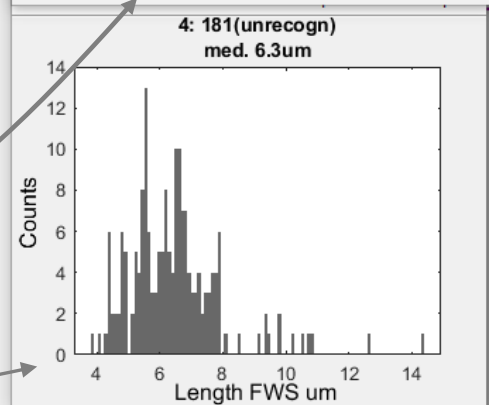
Check Instr. |
 Clustering |
 Data sums |
 After clustering |
 Specific groups

Settings EC |
 My Database |
 Data convert |
 Plot module |
 Image analysis

LIVE | Close figures | Exit

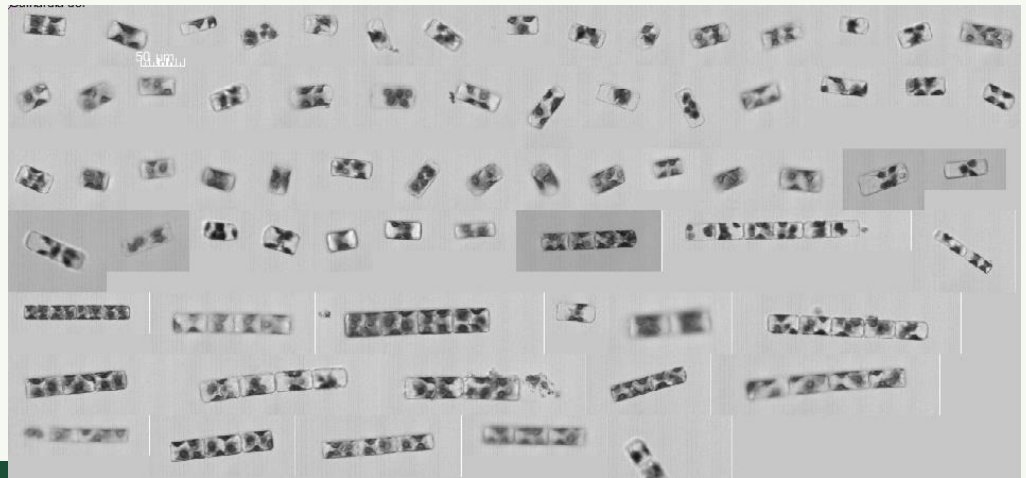


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1	CL-4: 181(unrecogn)	TOF	Length FWS	Length
2	N	181	181	
3	N_p_ml	266.2157	266.2157	
4	median	14.3000	6.3190	
5	mean	14.9017	6.4390	
6	min	9.3500	3.8082	
7	max	53.3500	14.3393	
8	std	4.8653	1.5052	
9	relstd%	32.6495	23.3768	



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Use of an own database for clustering & recognizing flowcytometric data to species types



Database editor

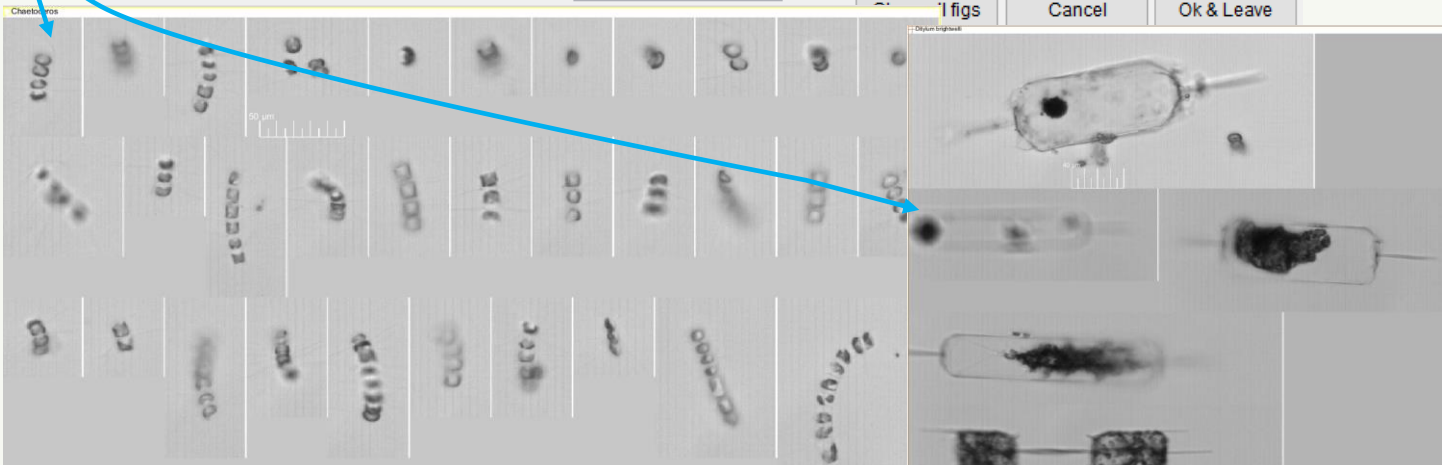
C:\Easyclusv122results\databases\phytodatabaseAP_16-Apr-2020_15u50.mat
C:\Easyclusv122results\databases\phytodatabaseAP_16-Apr-2020_15u50_images\

Import database.mat editor on/off import table.txt show fn

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Aggregates	Guinardia del_image_2.jpg	Guinardia del
Chaetoceros	Guinardia del_image_3.jpg	Guinardia del
Phaeocystis	Guinardia del_image_4.jpg	Guinardia del
Cryptophyceae	Guinardia del_image_5.jpg	Guinardia del
P_Rubescens	Guinardia del_image_6.jpg	Guinardia del
Rhizosolenia	Guinardia del_image_7.jpg	Guinardia del
Cyano filament	Guinardia del_image_8.jpg	Guinardia del
Guinardia del	Guinardia del_image_9.jpg	Guinardia del
Guinardia_stria	Guinardia del_image_10.jpg	Guinardia del
centrales_fresh	Guinardia del_image_11.jpg	Guinardia del
Chrysochromulina	Guinardia del_image_12.jpg	Guinardia del
Coccolithophores	Guinardia del_image_13.jpg	Guinardia del
Prorocentrum_min	Guinardia del_image_14.jpg	Guinardia del
Prorocentrum_balt	Guinardia del_image_15.jpg	Guinardia del
Ditylum brightwelli	Guinardia del_image_16.jpg	Guinardia del
	Guinardia del_image_17.jpg	Guinardia del
	Guinardia del_image_18.jpg	Guinardia del
	Guinardia del_image_19.jpg	Guinardia del
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 Montage All
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Interested? You are invited to send your cytometric data file and a description of what you need to info@ThomasRuttenProjects.com (e.g. by [wettransfer](#)).

For more information look also at:

Thomas Rutten Projects : ThomasRuttenProjects.nl

EasyClus software : EasyClus.com

Live phytoplankton results : phytoplanktonLIVE.com or fytoplankton.nl

Other products of Thomas Rutten Projects:

EasyFRRf TRP-software which works together with the Fast Repetition Rate Fluorescence, to process data from this instrument into primary production numbers also by using light attenuation in the water column and daily light history for water bodies.

EasyEcoScan Continuous scan on automated flowcytometry (or other sensors) to recognize outliers measured in the field by using different data filtering and moving windows techniques. Data is put on a/ your personal website.

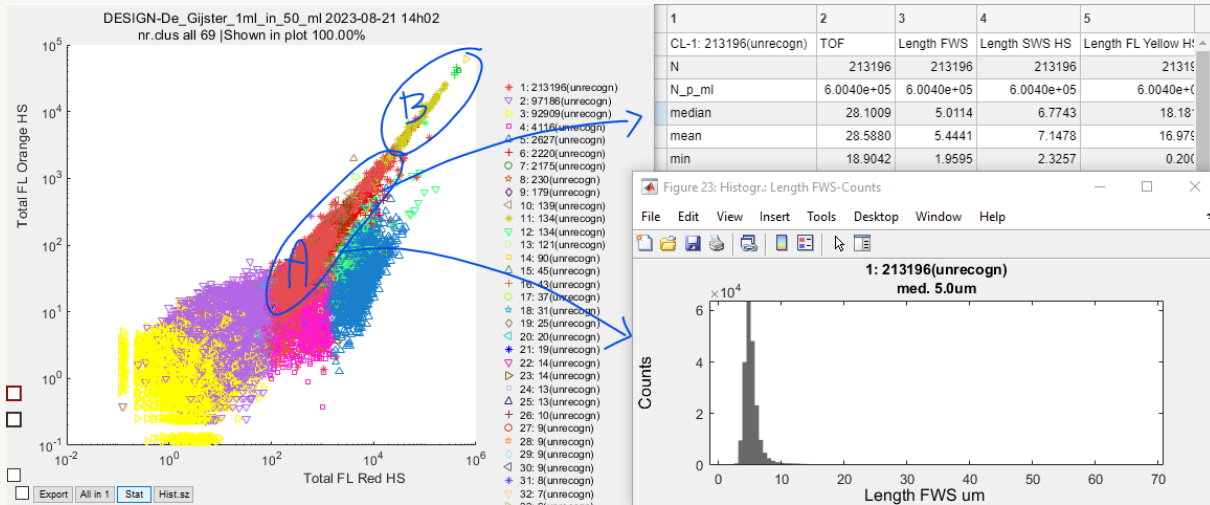
EasyRemote Continuous scan for checking your instrument(s) (e.g., CytoSense) on well performance, a service performed by Thomas Rutten Projects

Custom made EasyClus is 100% written by Thomas Rutten Projects, but you might need a more specific data processing tool, which performs the whole data analysis process 100% like you want, e.g., also with specific reports. These kinds of custom-made tools can be by Thomas Rutten Projects as well.

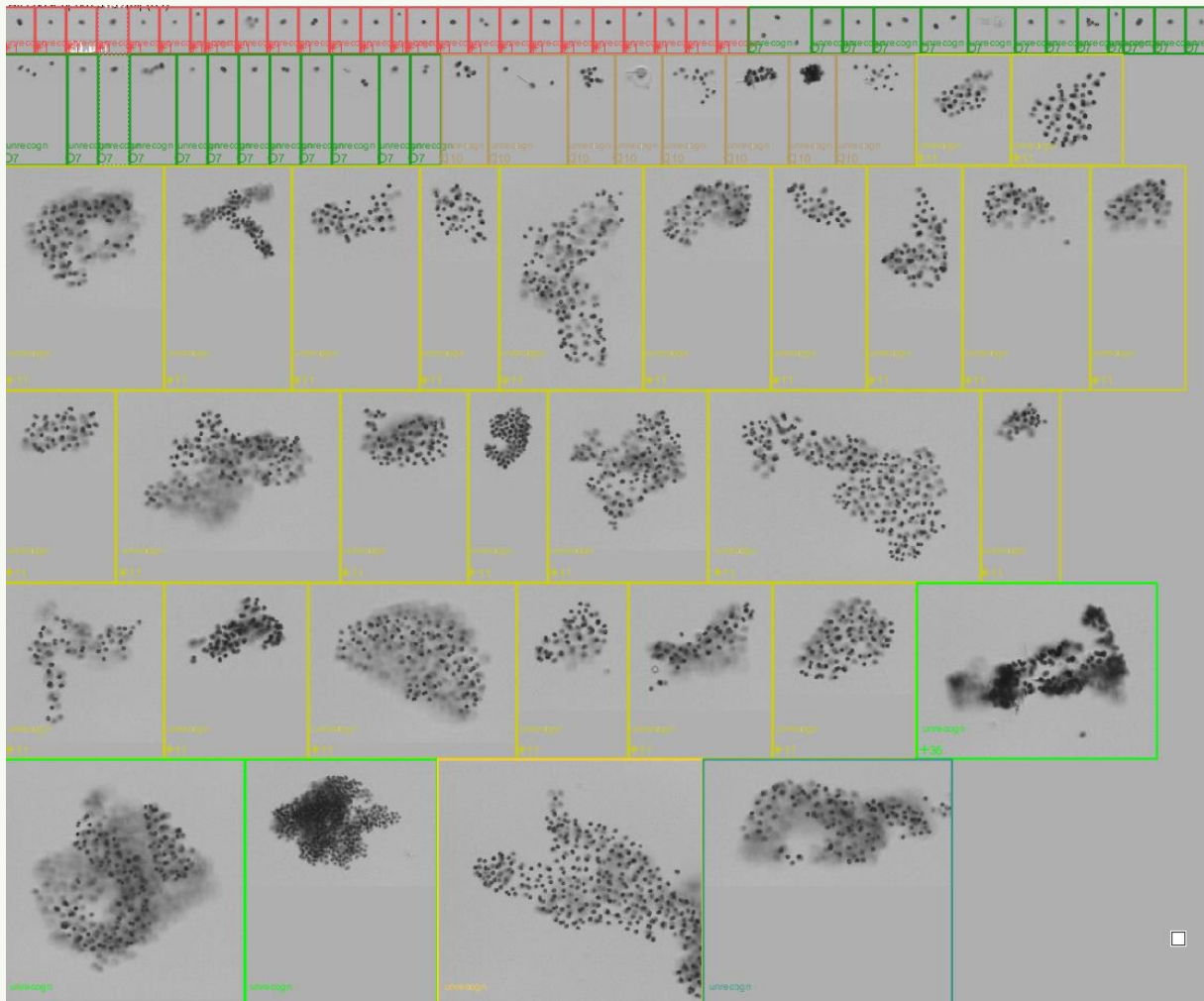
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Example 1: *Microcystis* spp.

Microcystis spp. single cells calculation is done by EasyClus: Counts=Total vs. Single cell biomass



Above : *Microcystis* spp. distributed in clusters with single cells (A) and more cells (B)



Images of *Microcystis* spp. cells made during flowcytometric measurement (CytoSense)

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Example 2: LIVE data analysis

Online real-time results, Instrument control and algae images by EasyClus LIVE upload to a website

PhytoplanktonLIVE.com

Online automatic phytoplankton monitoring at several locations performed by flowcytometry (CytoSense-CytoSub)

HOME

Live Results Eijsden

[to image_gallery](#) (if available)

PhytoplanktonLIVE.com

Online automatic phytoplankton monitoring at several locations performed by flowcytometry (CytoSense-CytoSub)

HOME TO OVERVIEW 1

[To overview 1](#)

Live Results Eijsden Control dashboard

[to image_gallery](#) (if available)

[data-total](#)
[data-totalT](#)
[data-fraction](#)
[data-instrcheck](#)
[data-biodiv](#)
[data-calibration](#)
[data-database](#)

PhytoplanktonLIVE | CytoSense Images | RWS Eijsden

Search

« prev 1 ... 4 5 6 7 8 ... 16 next »

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Example 3: Making algae reports

Reports in pdf can made directly after EasyClus clustering.

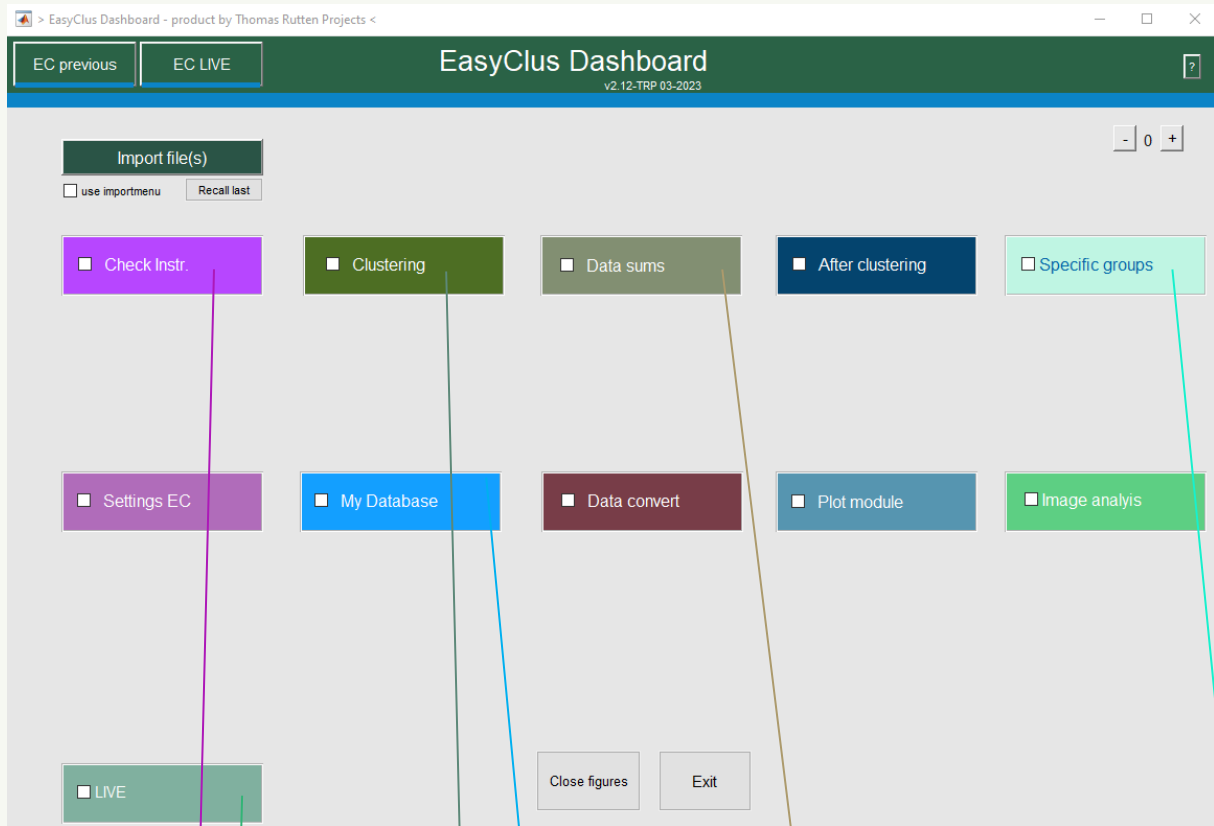
The image displays a collage of screenshots from the EasyClus software interface, illustrating the process of generating reports for algae clusters. The reports are organized into pages (page-1 to page-15) and include the following information:

- Report Header:** Report date: 22-Sep-2023, Operator: Thomas Rutten, Project: PROJECT Eijsden 20-9-2023_BLUE & Analysis date: 20-Sep-2023 12:14:24. Sample: EUJ2_SWS15_FLRed10_auto_uls_IMG_600s 2023-09-20 12h13.cyz.
- Cluster Data:** Lists clusters with their respective particle counts and FCM lengths. For example, Cluster 1: 10234 particles/ml (counts=12235) | FCM length: 5.9 um.
- Microscopy Images:** Shows individual particles or small groups of particles, often with a 30 um scale bar. Some images are labeled as "not recognized".
- Scatter Plot:** A log-log plot titled "Scatter plot-2" showing "Total FL Orange HS" on the y-axis and "Total FL Red HS" on the x-axis. The plot displays a dense distribution of points, with a legend on the right listing 54 clusters and their corresponding colors.
- Analysis Volume:** Analysis volume: 1195.5 ul.

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Example 4: Click and Run Software

EasyClus[®] runs in Matlab[®] software and uses menus to do launch several actions with your data.



Check Instr.

- Traffic lights check
- Recommendations
- Check pump
- Images sharpness
- Diagnosis menu
- Export meta data

Clustering

- Unsupervised
- Supervised
- Hybrid
- Manual
- Find my beads
- Cluster by X-tool

Data sums

- Sums
- Sums by fraction

use preproc data

Specific groups

- Cyano - PicoNanoMicroOth - Suspended matter - Single cells calc.

EasyClus LIVE

- Warn outlier
- Download img LIVE

LIVE

My Database

Data convert

Plot modu

- Database Editor
- Update database
- Make new database
- Make folders dbs
- Copy database
- Merge databases
- Make idnrs.mat dbs
- Mosaic dbs tool
- Add images to dbs
- Extract images .cyz
- Make lasso's
- BioVolume tool
- Menu database
- Make dbs by img
- Make dbs & CytoClus4
- Mismatch img vs signal

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EasyClus[®] menu's: Explanation what is behind the menu's

Check Instrument menu	Check Instrument menu to check the operation of the instrument via traffic lights, recommendations for better analysis, data diagnosis and meta data export
Clustering	Grouping of the multivariate data using several methods, unsupervised data analysis (without database or model), supervised analysis (database, model), hybrid = a combination of both methods, and more methods. Option to find reference beads and plot them in calibration charts
Data Sums	The total values of the whole sample per unit volume such as particle concentration, total red fluorescence (chlorophyll), and more, this can also be performed by the contributions per particle size fractions (0-5, 5-10 μm , etc.)
After Clustering	The calculation of bio-indices, which are based on found groups, re-labeling of groups, export of cluster results
Specific groups	The calculating of cyanobacteria as a total group, grouping of algae into pico-, nano-, micro-plankton and by fluorescence characteristics (cf. internationally agreed grouping), suspended matter calculation and a method to calculate single cells from colony- or chain forming cells
Settings EasyClus	Settings to be set, for example using preprocessing 'dynamic signal shaping' to reshape flattened signals, because the detector has each its maximum range
My Database	Extensive menu to edit, create, update, check, expand, visualize and improve your database
Data convert	Converting data such as merging many fcm-files, only producing all images from a file, converting cyz (CytoSense)-format to '.mat', synchronizing (based on time) one data file with another data file by interpolation
Plot module	All kinds of options to produce data figures
Image analysis	Use of images and images-data analysis, which can be clustered based on images-data, biovolume calculation based on images and FCM data
LIVE	LIVE analysis of a LIVE working CytoSense including upload to a website (e.g., https://www.fytoplankton.nl)