Thanks for downloading our guide!

Some important things to take note of as you read on:

Who this document is for?

This document provides instructions for people wanting to automatically download data via the API.

The intention is that the data are queried automatically and integrated into your own database in near real-time.

If you need further technical support, please contact support@cyanolakes.com.

Happy reading, and good luck!

The CyanoLakes team

API Users Guide: How to automatically download data using the API

Contents

1. API reference

The API provides access to the data so that it can be downloaded for analysis, or integrated into your database or app. The API reference documentation can be found here: https://online.cyanolakes.com/docs.

The API provides data in two formats: HTML and JSON. Navigating to the API web address will yield the HTML format. The JSON format is obtained by appending ?format=json to a query.

The API root address is https://online.cyanolakes.com/api/

The following five API views are available:

1) /dams/ – provides dam geometries with optional date
2) /dates/ provides dates for which data exist
3) /user-dams-with-stats/ - provides risk information summary including dams
4) /summary-statistics/ - provides risk information summary
5) /statistics/ – provides detailed statistics for a given dam (and/or date)

The unique dam_id and date are used as follows:

- /dates/<dam_id>/ - returns all dates for dam ID for which results exist
- /user-dams-with-stats/latest/ - returns dams and latest risk level information
- /user-dams-with-stats/<date>/ - returns dams and risk level information for date
- /statistics/<dam_id>/<date>/ - get statistics for a dam ID for given date
- /summary-statistics/<dam_id>/<date>/ - statistic of a given dam for a given day

Examples:

Return dates for a dam ID in json format:

https://online.cyanolakes.com/api/dates/<dam_id>/?format=json

Return statistics using a dam_id and date in html format:

https://online.cyanolakes.com/api/statistics/<dam_id>/<date>/

The full list of statistical data available via the API are shown in Appendix A.

2. Downloading data using the API

R programming language can be used for downloading the data available through the API to .csv files that can be opened in Microsoft Excel or another program for further analysis.

How to download data:

1. Download the R scripts from https://github.com/CyanoLakes/API-Scripts
2. Copy the R scripts to a folder on your computer
3. Download and install R on your computer from https://www.r-project.org
4. Edit the R scripts by specifying your username, password, the directory and the file name where you would like to save the data
5. Once installed, run the scripts in R
6. Check that the data has been downloaded to the file specified in your script

The following example shows how the API is queried in R.

```
# Open libraries
library("jsonlite")
library("httr")

# Login credentials
username <- "username"
password <- "password"

# API query options
base <- "https://online.cyanolakes.com/api/"
endpoint <- "dams"
format <- "json"

# Specify query
call1 <- paste(base, endpoint, "?", "format", "=", format, sep="")

# Query API
dams <- GET(call1, authenticate(username, password, type = "basic"))

# Get content and format in JSON
dams <- content(dams, "text")
dams <- fromJSON(dams, flatten = TRUE)

# Convert to data frame
dams <- as.data.frame(dams)

# View data frame
View(dams)
```

Appendix A: Data reference

Name	Description	Units	Data type	Format	Example	Details
satellite	Name of satellite		str		MERIS	Medium Resolution Imaging Spectrometer
source_type	Satellite product type		str		MER_FSG_1P	Full Resolution Full Swath Geolocated and Calibrated TOA Radiance
source_name	Name of satellite swath		str		MER_FSG_1PNEPA20030104_073322_000001572012_00364_04426_8506	Source file specific product header.
product	Type of product		str		Maximum peak height algorithm chlorophyll-a	
algorithm	Algorithm used to produce data		str		MPHV1.0	Maximum Peak Height V1.0. Version of the MPH algorithm.
name	Name of water body		str		Hartbeespoort	
id	Identification no.		int		12	Unique ID number
cyanobacteria_risk_level			str		“Low”	Cyanobacteria risk level
cyanobacteria_cell_count		Cells/l	int		2510	Cyanobacteria cell count derived from the median chlorophyll-a value from cyanobacteria
trophic_status			str		“Mesotrophic”	Trophic status level
last_updated_date		days	str	yyyy-mm-dd	"2018-11-17"	Date of most recent update for waterbody
date	Date		str	yyyy/mm/dd	10/01/01	Date of image acquisition.
time	Overpass time (local time zone)		str	hh:mm:ss	10:05:32	Time of image acquisition.
lat	Latitude	degrees	float	decimal degrees	-25.746	Latitude of center pixel
lon	Longitude	degrees	float	decimal	27.863	Longitude of center pixel

Name	Description	Units	Data type	Format	Example	Details
				degrees		
chla_med	Median chlorophyll-a value	ug/l	float		10.5	Median value of all pixels with valid chlorophyll-a values
chla_std	Standard deviation of the mean chlorophyll-a value	ug/l	float		5.5	Standard deviation of of all pixels with valid chlorophyll-a values
chla_min	Minimum chlorophyll-a value	ug/l	float		3.2	Minimum value of all pixels with valid chlorophyll-a values
chla_max	Maximum chlorophyll-a value	ug/l	float		25.1	Maximum value of all pixels with valid chlorophyll-a values
chla_mean	Mean chlorophyll-a value	ug/l	float		15.2	Mean value of all pixels with valid chlorophyll-a values
chla_cyano	Mean chl-a value for cyanobacteria-dominant pixels	ug/l	float		2.0	Mean chlorophyll-a value from pixels identified as cyanobacteria-dominant
chla_noncyano	Mean chl-a value for algae-dominant pixels	ug/l	float		2.0	Mean chlorophyll-a value from pixels identified as algae-dominant (not cyanobacteria)
pixel_count_water	Number of pixels from shapefile land mask		int		250	Number of potential water pixels.
pixel_count_vis	Number of visible water pixels		int		200	Calculated as pixel_count_water - (pixel_count_cloud+pixel_count_glint)
pixel_count_cloud	Number of pixels over water flagged as cloud		int		5	Number of pixels where cloud flag is raised over water target.
pixel_count_glint	Number of pixels over water affected by sun glint		int		0	Number of potentially valid water pixels excluded due to sunglint.
pixel_count_chla	Number of pixels with valid chlorophyll-a values		int		200	Number of valid water chlorophyll-a pixels.
pixel_count_cyano	Number of pixels identified as cyanobacteria		int		50	Number of pixels where cyanobacteria flag is raised.
pixel_count_scum	Number of pixels identified as cyanobacteria surface scum		int		25	Number of pixels where cyanobacteria surface scum flag is raised. Scum defined as chlorophyll-a values greater than 350 mg/m3.

Name	Description	Units	Data type	Format	Example	Details
pixel_count_veg	Number of pixels identified as floating vegetation		int		0	Number of pixels where floating vegetation/land flag is raised. Note: discrimination between floating aquatic vegetation and land not performed.
pixel_count_adj	Number of valid water pixels identified as straylight affected		int		25	Number of valid water pixels affected by stray light (adjacency effect).
area_vis_perc	Surface area of lake surface visible	%	float		100	Calculated as (pixel_count_vis/pixel_count_water)x100
area_cloud_perc	Surface area of water body covered by cloud	%	float			Calculated as (pixel_count_cloud/pixel_count_water)x100
area_glint_perc	Surface area of water body affected by sun glint	%	float		0	Calculated as (pixel_count_glint/pixel_count_water)x100
area_chl_perc	Surface area with valid chlorophyll-a estimates	%	float			Calculated as (pixel_count_chl/pixel_count_water)x100
area_cyano_perc	Surface area coverage of cyanobacteria in percent	%	float		25	Area coverage of cyanobacteria calculated as (pixel_count_cyano/pixel_count_chla)x100
area_scum_perc	Surface area covered by cyanobacteria scum in percent	%	float		12.5	Area coverage of cyanobacteria surface scum calculated as (pixel_count_scum/pixel_count_chla)x100
area_veg_perc	Surface area covered by vegetation in percent	%	float		0	Area coverage of vegetation calculated as (pixel_count_veg/pixel_count_water)x100
area_adj_perc	Surface area affected by adjacency effect	%	float		5	Calculated as (pixel_count_adj/pixel_count_chl)x100
area_vis	Surface are of visible pixels	m sq	float		5000	Calculates as pixel_count_vis * pixel_area, where pixel_area = (260 m x 290 m)
area_total	Surface area of valid chlorophyll-a retrievals in m squared	m sq	float		5000	Calculated as pixel_count_chla * pixel_area, where pixel_area = (260 m x 290 m)
area_cyano	Surface area of cyanobacteria in m squared	m sq	float		5000	Calculated as pixel_count_cyano * pixel_area, where pixel_area = (260 m x 290 m)
area_scum	Surface area of surface scum in m squared	m sq	float		5000	Calculated as pixel_count_scum * pixel_area, where pixel_area = (260 m x 290 m)
area_veg	Surface area of vegetation in m squared	m sq	float		5000	Calculated as pixel_count_veg * pixel_area, where pixel_area = (260 m x 290 m)

Name	Description	Units	Data type	Format	Example	Details
pixel_count_oligo	Number of ologotrophic pixels		int		2	Calculated for chl-a < 10 ug/l
pixel_count_meso	Number of mesotrophic pixels		int		2	Calculated for 10 ug/l < chl-a < 20 ug/l
pixel_count_eu	Number of eutrophic pixels		int		5	Calculated for 20 ug/l < chl-a < 50 ug/l
pixel_count_hyper	Number of hypertrophic pixels		int		10	Calculated for chl-a > 50 ug/l
pixel_count_cyano_risk_low	Number of pixels with low health risk according to WHO standards		int		0	Count of valid chl-a pixels not identified as cyanobacteria.
pixel_count_cyano_risk_mild	Number of pixels with mild health risk according to WHO standards		int		0	Count of pixels identified as cyanobacteria with chl-a less than 50 ug/l
pixel_count_cyano_risk_mod	Number of pixels with moderate health risk according to WHO standards		int		10	Count of pixels identified as cyanobacteria with chl-a less than 100 ug/l and greater than 50 ug/l
pixel_count_cyano_risk_high	Number of pixels with high health risk according to WHO standards		int		10	Count of pixels identified as cyanobacteria with chl-a greater than 100 ug/l
perc_cloud	Percentage of scene covered by cloud	%	int		10	Cloudiness of scene
szenith	Salar Zenith Angle	degrees	float		45.2	Solar zenith angle for center pixel.