The Lake Observations by Citizen Scientists & Satellites (LOCSS) Level 1 Version 1.0 Dataset User's Guide

LOCSS Project

Lake Observations by Citizen Science and Satellites project (LOCSS) is a lake monitoring network. LOCSS is a NASA-funded project, begun in 2017, that aims to collaborate with local citizens to better understand how the volume of water in small and medium sized lakes (i.e. lakes with an average surface area less than 100 km2) is changing over time in multiple countries (https://www.locss.org/). At each location, a lake gauge is installed and provided with a cellphone number. On top of the gauge is a sign with instructions, a unique gauge ID, and a phone number (Figure 1). Local citizens read the water level at each lake gauge and send in the measurement in a text message, along with the gauge ID. Data can also be manually collected and uploaded later from the website in remote places where cell phone signal is challenged. The readings are specified in cm, m, or ft, according to the local unit system. The measurements are recorded and displayed in real-time on the LOCSS website. The data submitted by the citizen scientists occur mostly at random time intervals, with some gauges having more readings than others (Little et al., 2021). Such-contributed lake height data provide a viable alternative to ground-based systems that require a larger institutional capacity for maintenance and monitoring, when automated gauges are absent or sparsely distributed (Ahmad et al., 2020).

(a)

(b)

Figure 1. An example of a LOCSS lake gauge with a sign on top for texting in measurements. Figure (a) depicts a LOCSS lake gauge sign and what a citizen scientist would read. Figure (b) depicts a LOCSS lake gauge located in Lake Howard,WA. (Little et al., 2021)

Figure 2 shows an example of LOCSS water level readings for Coldwater lake, Washington, USA. Figure 2a shows the google map location, city, latitude, longitude, number of readings, Gauge ID, and latest Readings for Colwater lake. Figure 2b shows the timeseries of gauge readings spanning from 2019 through 2022 in units of Feet (https://www.locss.org/).

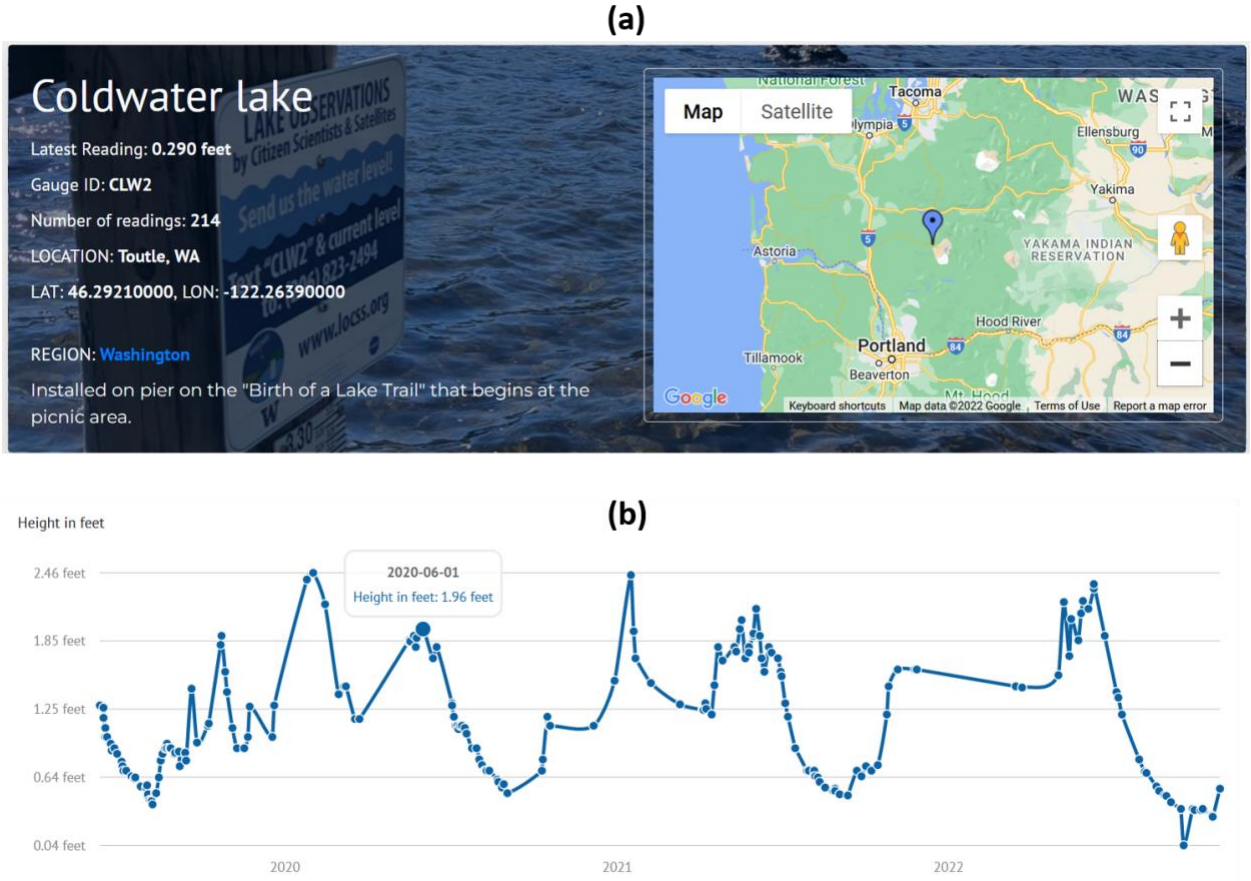

Figure 2. An example of LOCSS lake water readings. Figure (a) depicts the Coldwater lake info in Toutle, WA. Figure (b) depicts timeseries of lake readings in feet from 2019 through 2022

Data Description

This version of the dataset has lakes located in seven (7) countries: Bangladesh, India, Canada, the United States, Pakistan, and Nepal. Temporal coverage spans from January 01 2017 to May 29 2022. The data represent the location and main descriptors of the lake gauges and their readings. This product consists of two files in comma-separated values (csv) format:

1) the list of gauges with the following naming convention:

gauges_list_all_<RangeBeginningDateTime>_<RangeEndingDateTime>.<extension>

RangeBeginningDateTime and *RangeEndingDateTime* are in the YYYY-MM-DD format. The *extension* is csv. All the **attributes of gauges** can be found in this csv file. Here's the description of fields:

Field	**Description**
gauge_id	Gauge identification (ID). Each ID follows a convention of 4 digit code for each lake. The last two digits indicate the state/region/country. For example, North Carolina lakes end in N2, France Lakes end in R2, and Bangladesh Lakes end in B2.
name	Name of the lake
latitude	Latitude based on WGS-84 datum
longitude	Longitude based on WGS-84 datum
city	Location of the lake. Typically, is formed of two values, the local city/province and the state/country
timezone	Time zone in which the gauge is located.
min_height	Minimum height of the gauge specified in the gauge units. All the readings lower than this value must be filtered out
max_height	Maximum height of the gauge specified in the gauge units. All the readings higher than this value must be filtered out
unit	Units in which each measurement is reported. It can be feet (FEET), centimeter (CM), or meter (METER)
installation_date	Date in which the gauge was installed
notes	Notes of installation

2) The list of water level readings by each gauge specified in the local time and with the following naming convention:

lake_heights_all_<RangeBeginningDateTime>_<RangeEndingDateTime>.<extension>

RangeBeginningDateTime and *RangeEndingDateTime* are in the YYYY-MM-DD format. The *extension* is csv. All the **attributes of water level readings** can be found in this csv file. Here's the description of fields:

Field	**Description**
gauge_id	Gauge identification (ID). Each ID follows a convention of 4 digit code for each lake. The last two digits indicate the state/region/country. For example, North Carolina lakes end in N2, France Lakes end in R2, and Bangladesh Lakes end in B2.
name	Name of the lake
latitude	Latitude based on WGS-84 datum
longitude	Longitude based on WGS-84 datum
date	Date and time of the measurement in the gauge timezone in coordinated universal time (UTC). Format YYYY-MM-DDTHH:MM:SSZ
height	Height specified in the gauge units. It can be feet (FEET), centimeter (CM), or meter (METER)
min_height	Minimum height of the gauge specified in the gauge units. All the readings lower than this value must be filtered out
max_height	Maximum height of the gauge specified in the gauge units. All the readings higher than this value must be filtered out
unit	Units in which each measurement is reported. It can be feet (FEET), centimeter (CM), or meter (METER)

is_bubble_level_okay	Indicate if the gauge is properly leveled. Each gauge has a bubble level that is observable by the citizen. Options include: 1 for YES, 2 for NO, 3 for I don't know, 4 for No Information Available
notes	Additional notes to the measurement

References

Little, S., Pavelsky, T. M., Hossain, F., Ghafoor, S., Parkins, G. M., Yelton, S. K., ... & Topp, S. N. (2021). Monitoring variations in lake water storage with satellite imagery and citizen science. Water, 13(7), 949.

Ahmad, S. K., Hossain, F., Pavelsky, T., Parkins, G. M., Yelton, S., Rodgers, M., ... & Biswas, R. K. (2020). Understanding volumetric water storage in monsoonal wetlands of northeastern Bangladesh. Water Resources Research, 56(12), e2020WR027989.

How to Cite this Dataset

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