

JAPANESE LAKE INFORMATION IN A WEB APPLICATION, THE CLIMATES OF LAKE BASINS (CGLB)

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ABSTRACT

This study investigates what information and how much about lakes in Japan are accessible for preliminary scientific investigations through the Internet. A web application, Climates of Global Lake Basins (CGLB) have been developed for providing lake information from the view point of hydrological and water resources by the combination of existing data sets.

Keywords: Lake Biwa, database, web application, climate, Japan

1. INTRODUCTION

Lakes are very important for multi-sectors including water sector in Japan because of large demand of water use and of hydroelectric power generations. Japanese know lakes in their own country but foreign researchers do not always so. For an example, Wikipedia contains 29 dams with a hydroelectric power reservoir. It is interesting to know how much information about lakes in Japan we can obtain on the Internet. This study investigates what information and how much about lakes in Japan are accessible for preliminary scientific investigations through the Internet. A web application, Climates of Global Lake Basins (CGLB) have been developed for providing lake information from the view point of hydrological and water resources by the combination of existing data sets. The distinction of CGLB from other web applications is that CGLB has a drawing functions of climatological information on demand. CGLB also provides landscape photographs provided by Global Confluence Project as well as quasi-real time monitoring of lake water levels using satellite altimetry provided by U.S. Department of Agriculture. The first version of CGLB contained about 600 lakes or more in the world. Recently, CGLB has been upgraded by changing a lake information database from the World Lake Database (WLDB; <http://wldb.ilec.or.jp/>; ILEC 1999) to the HydroLAKES (Messenger et al. 2016) following a new development of the source code due to introduction of a free database module to treat more than more than 1 million of lakes. Lake database targeting the entire world contains some lakes only due to the coverage of the whole globe. For example, WLDB contains 31 lakes in Japan: the largest Lake Biwa, the deepest Lake Tazawa and so on. As an example, we demonstrate what information and how much data of Lake Biwa are available from CGLB.

2. WEB APPLICATION SETUP

If the author needs to create a component which is not prescribed here, please incorporate applicable criteria that follows the styles provided (*e.g.*, spacing and typeface). We designed CGLB as provision of climatological information for a target lake basin so that one who want to look into the lake basin can obtain the information interactively for each own purpose. SQLite is employed to deal with more than 1 million entry. SQLite is a relational database management system and often embedded into the end program but not client-server database engine. New features of the CGLB are summarized below:

1. replace of base lake geo-spatial information: HydroLAKES (Messenger et al.; 2016); more than 1 million lakes are listed in CGLB and other components such pouring points are newly included in CGLB,
2. figures of lake shapes with either elevation or land cover type can be drawn interactively,
3. lake surface temperature can be drawn in one- or two-dimensional time series,
4. link to submonthly climatology in ClimatView developed by Japan Meteorological Agency: daily data can be seen but the number of the stations are small, and
5. SQLite is embedded into the end program, allowing more than 1 million entry and search by keywords.

3. LAKE BIWA, AN EXAMPLE

Lake Biwa is the largest in Japan with the surface area of 674 km² and serve as reservoir supplying to residents in 118 local governments around the lake, amount of which reaches 15 million. The outlet is the Seta River which changes the name to the Uji River and to the Yodo River. Figure 1 shows the screenshot of CGLB for Lake Biwa. Main panel shows the geographical map in Google Maps; right top panel shows a broad geographical map; lower right panel lists the hydro- and limnological features of Lake Biwa. The surface meteorological stations operated by national meteorological and hydrological services can be denoted by red flag on the geographical map.

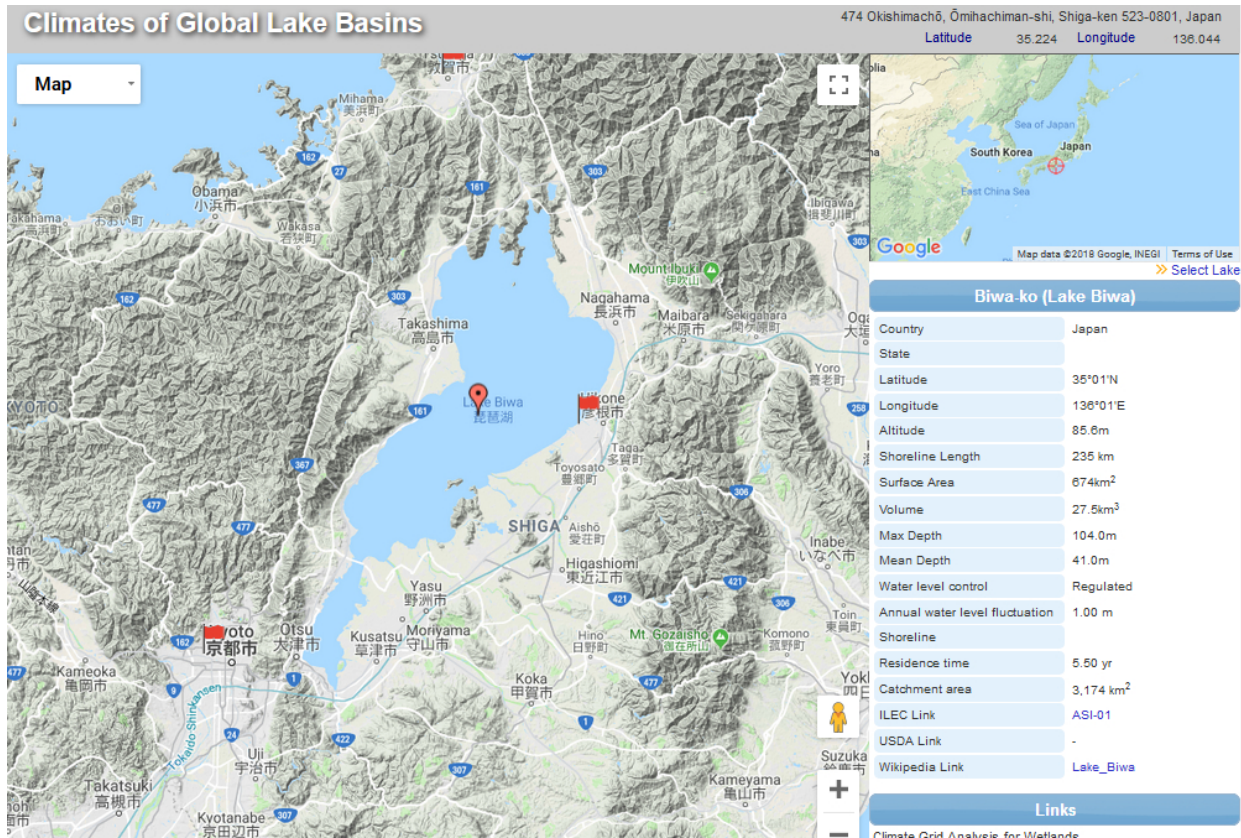


Figure 1. Screenshot of CGLB for Lake Biwa. Main panel shows the geographical map in Google Maps; right top panel shows a broad geographical map; lower right panel lists the hydro- and limnological features of Lake Biwa. Red flags denote the surface meteorological stations operated by Japan Meteorological Agency.

Climatological mean surface air temperature and precipitation at Hikone located on the eastern shoreline of Lake Biwa denoted by the red flag. This web page is operated by the Japan Meteorological Agency. (Top) graphical format and (left) values. This web is linked to the red flag and by clicking on the geographical map, user can reach the meteorological information. Not only the time series of the two variables, but also the geographical distributions of the two and others can be drawn on demand (Nakaegawa et al. 2018, 2019a).

Quasi real time water levels for large lakes are observed with a satellite altimeter. Unfortunately, no lake is observed with it due to its orbit and the size of lakes in Japan.

HydroLakes contains 980 lakes in Japan out of more than 1 million, and the number of Japanese lakes occupy about 1/1000 in HydroLakes.

4. CONCLUSIONS

We upgraded a web application of CGLB by introducing a new lake database, HydroLAKES with more than 1 million entry of lakes by combining existing datasets and interactively displays geographical, hydrological, and climatological information around the world. These functions are useful for education, expedition planning, and scientific research.

This extended abstract is prepared based on the author's ones in three proceedings (Nakaegawa, 2018, 2019a, 2019b) and therefore, the contents of Introduction and web application setup sections are almost the same as in the author's articles in the Proceedings of the 17th World Lake Conference held in Tsukuba, Japan

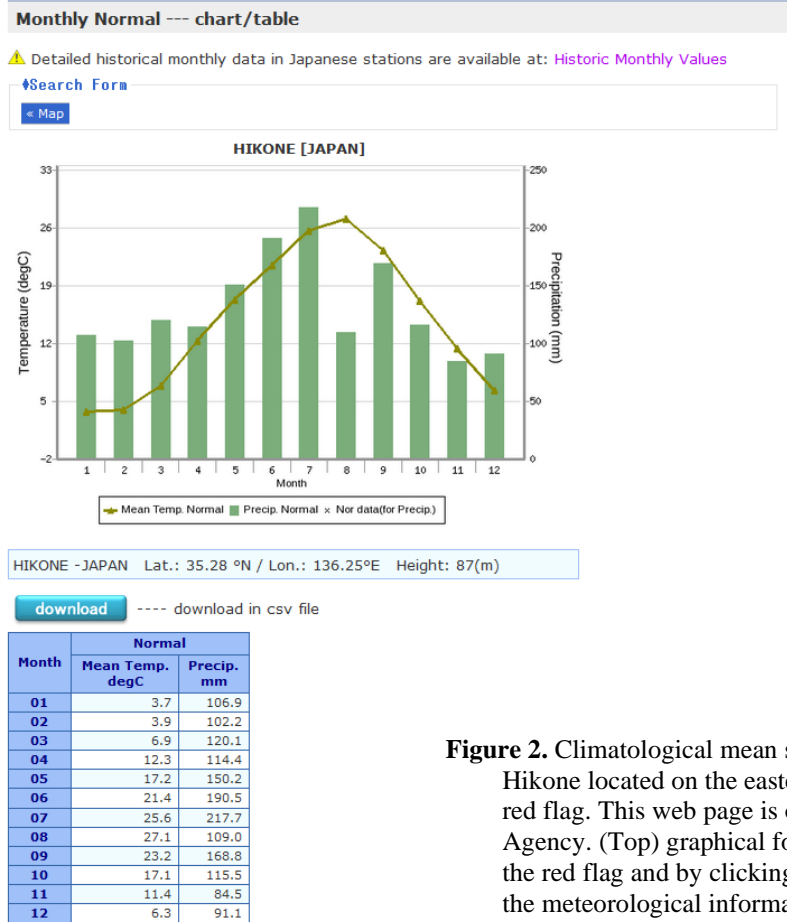


Figure 2. Climatological mean surface air temperature and precipitation at Hikone located on the eastern shoreline of Lake Biwa denoted by the red flag. This web page is operated by the Japan Meteorological Agency. (Top) graphical format and (left) values. This web is linked to the red flag and by clicking on the geographical map, user can reach the meteorological information.

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in 2018 and Proceedings of the THA2019 held in Bangkok, Thailand in 2019, and the 38th IAHR held in Panama City, Panama 2019.

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