Creating the first consistent record of Lakes essential climate variables

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Level

Extent

Temperature

Ice cover

Reflectance

Lakes are rapidly responding systems and key sentinels of global change. Variations in temperature and precipitation can profoundly affect the hydrological functioning of the lake and its catchment. They can also play a role in climate regulation as well as being a strategic resource of freshwater supply. A globally harmonized observation approach is needed to identify climate signals in lake physical, hydrological and biogeochemical change and to feed lake state into numerical models.

< **The objective of Lakes CCI** is to exploit satellite Earth Observation data to create the largest and longest possible consistent, global record of the five lake climate variables >

The first Climate Research Data Package (v1, 2020) was recently created for up to **250 globally distributed lakes**. It brings together the state-of-the-art in satellite observation using thermal, optical and altimetry missions. The data set covers the full suite of thematic ECVs from 2002 to 2019, with some extending further back to 1992.

A first look at multi-disciplinary Lake climate trends

The lakes in the first CRDP (Fig. 1) are receiving detailed focus in five themed use cases (Greenland, Ecological networks, large lakes, brownification and the Danube). Ridgeplots help visualize the dataset distribution over time and Fig. 2 shows show some lakes have undergone extensive change in extent. The reflectance ECV can be used to estimate parameters such as chlorophyll-a (Fig. 3) and turbidity (both included in the CRDP).
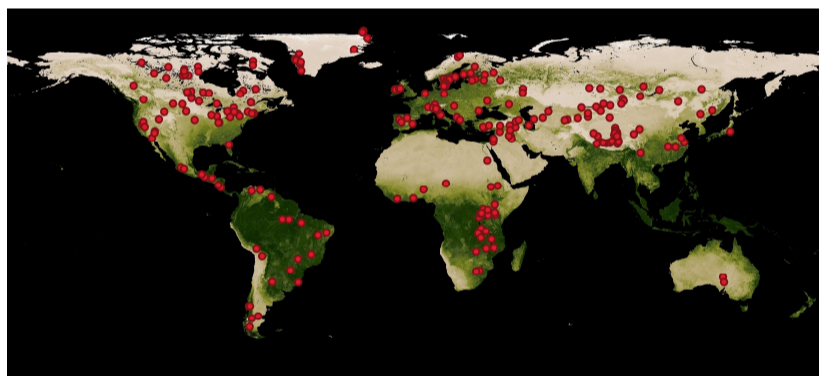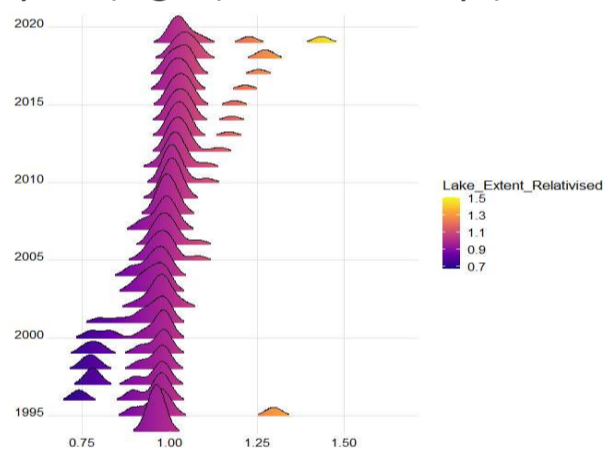

Figure 1. Distribution of the CCI lakes
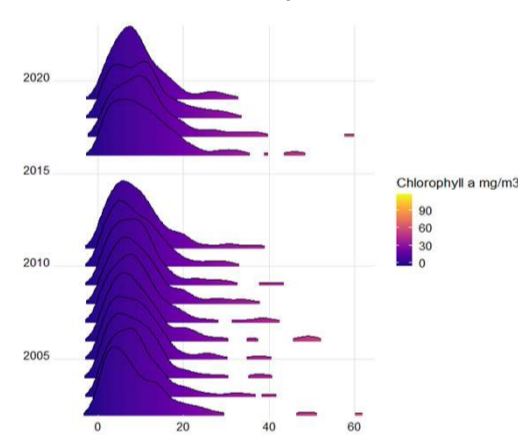

Figure 2. Lake Extent relativised

Figure 3. Lake Chlorophyll-a

> next: CRDP v2.0

Some of the improvements planned towards the final CRDP of the Lakes_cci phase 1 project include

- Extending spatial coverage to nominally 2000 lakes
- Filling temporal gaps by adopting legacy and new sensors, including algorithm evolution
- Evaluating new algorithms for Lake Ice Cover and Lake Water Extent
- Improved uncertainty characterization/modelling, particularly where in situ reference data are scarce

Version 2.0 of the data set is expected to be ready in summer 2021.

Project consortium

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