

# PALEOCLIMATIC RECONSTRUCTION STUDIES IN LAKE SEDIMENTS: MAJOR PROXIES, TECHNICAL EVOLUTION AND DATABASE

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## 1. Research Motivation

Lake sediments are continental indicators sensitive to environmental changes and have been used to reconstruct climate parameters;

In these studies there are variations not only in the type of proxies used, but also in the relationships between them.

## 2. Methods

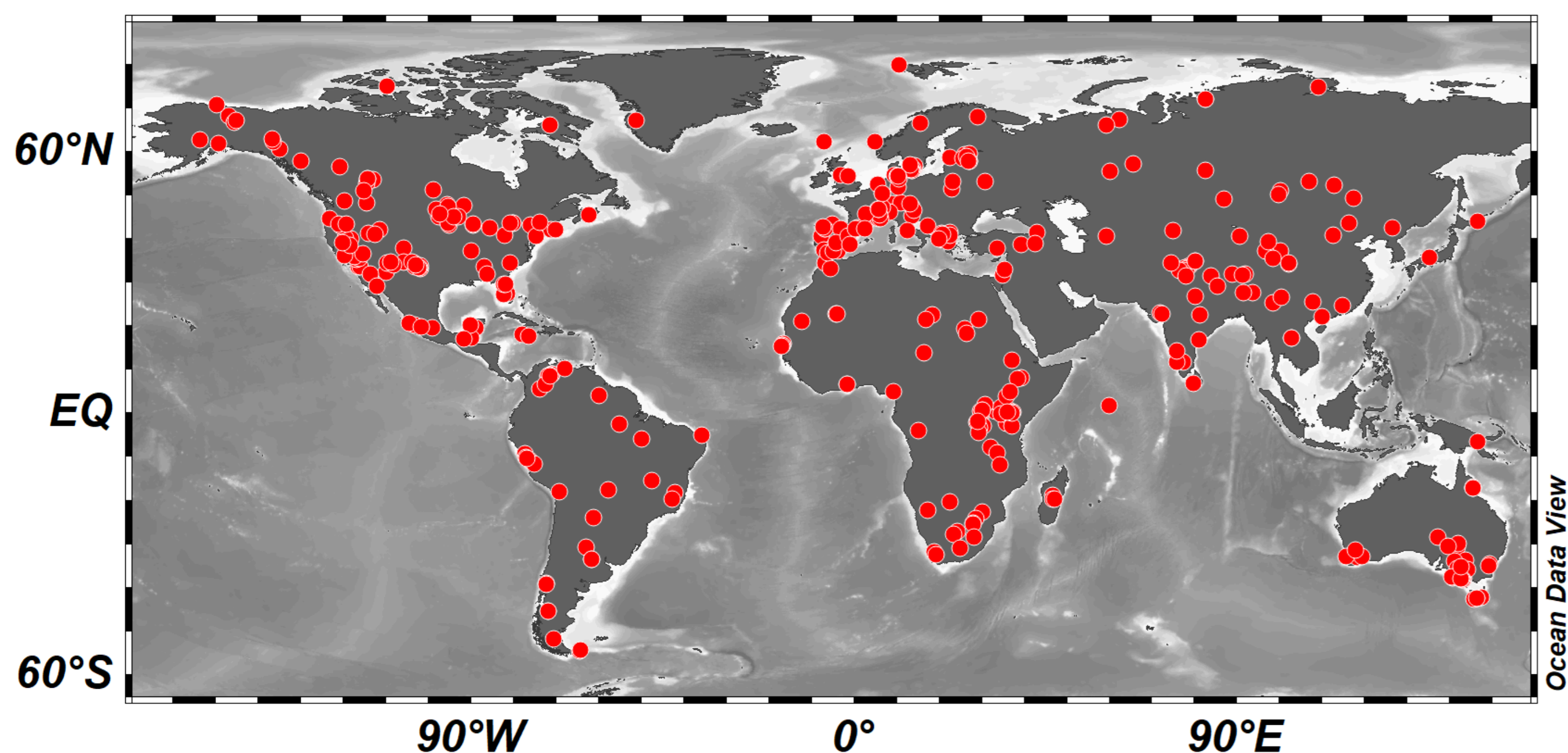
We compiled 185 Publications, from 1985 to 2020;

Analyses of 410 lakes around the world were considered;

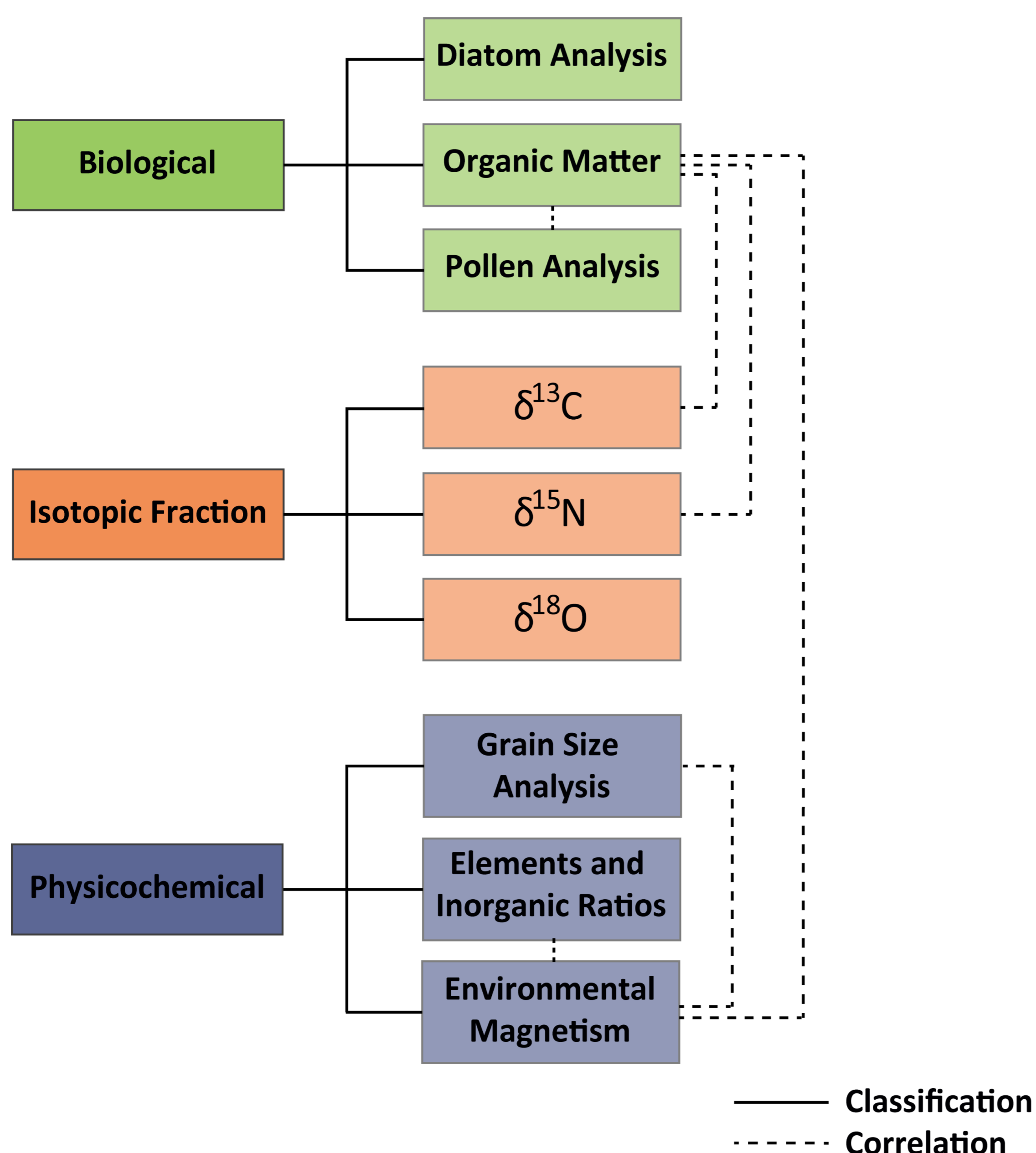
Biological proxies, isotopic fractions and physicochemical proxies were analyzed and correlated in this study.

| Continent       | Number of Lakes |
|-----------------|-----------------|
| Africa          | 68              |
| Asia            | 56              |
| Central America | 3               |
| Europe          | 104             |
| North America   | 108             |
| Oceania         | 34              |
| South America   | 37              |

Table with the 410 lakes used in this study separated according to the continent in which they are found.



Map showing the location and distribution of the 410 lakes that were considered in this study.



Classification of proxies used in this work and the correlation between the proxies that were usually used together and with complementary information in the analyzed publications.

## 3. Results

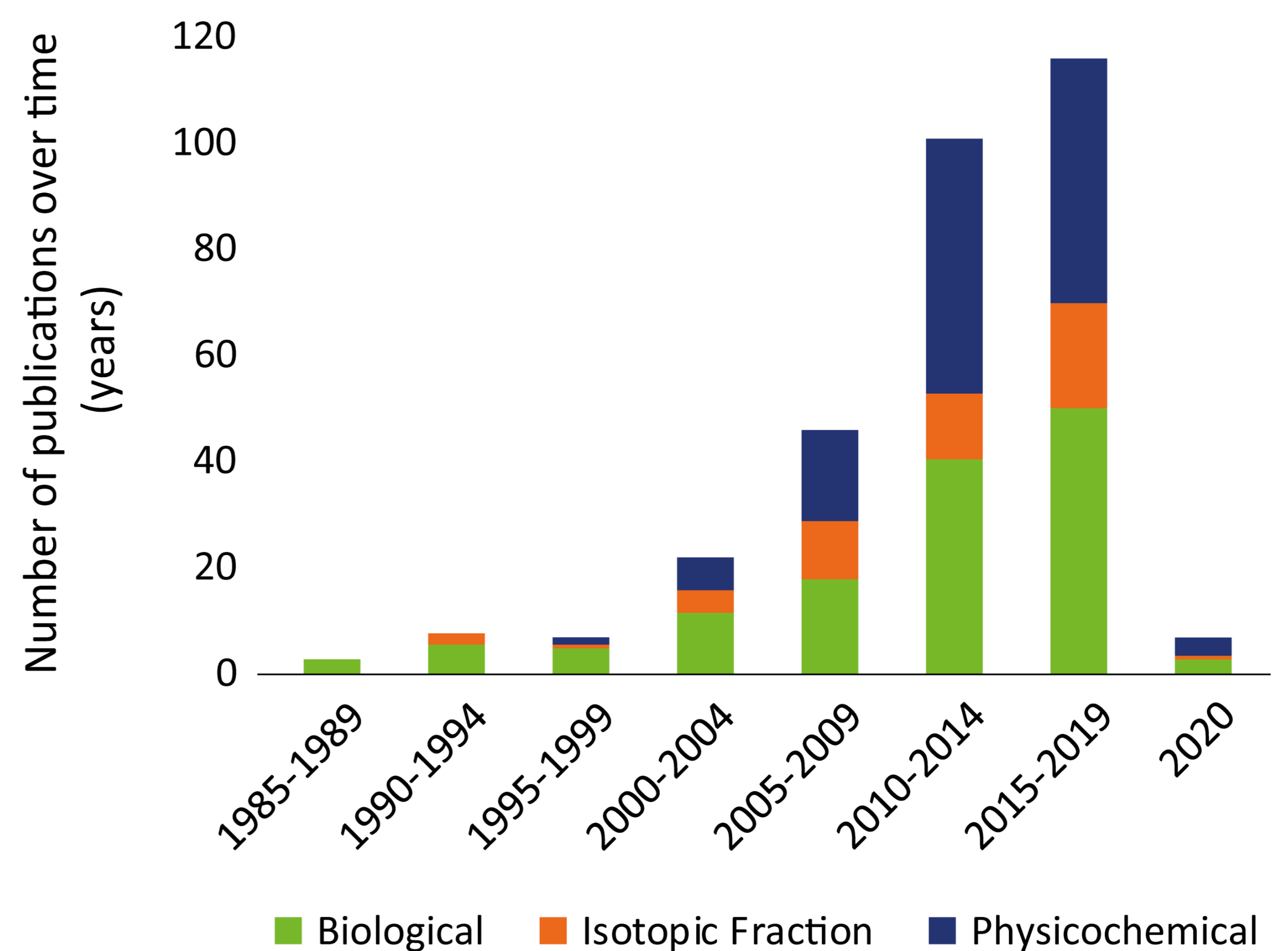
We observed that over the years there was a change in the type of proxy most used in these studies;

In the 1980s, practically only biological proxies were used;

In the early 1990s, isotopic fractions began to be used, as well as physical-chemical proxies, towards the end of that decade;

From the 2000s onwards, it was possible to observe the use of the three types of proxy, with biologicals being more widely used, followed by physicochemicals and, lastly, isotopic fractions.

### Evolution in the use of the different proxy types



Evolution in the frequency in which each of the three types of proxy was used in the publications analyzed in this study, which cover the period between 1985 and January 2020.

We found different studies in the same lake with the analysis of different proxies over the years, as in the case of the Tso Kar Lake (India). This lake was analyzed by Bhattacharyya (1989) and Demske et al. (2009), through pollen analysis, and later by Wünnemann et al. (2010), through a multiproxy study;

We also realized that the choice of proxies varies according to the location of the lakes. Lakes in more arid regions have been studied through biological proxies (e.g. Harrison, 1993; Raj et al., 2015), while lakes in more humid regions have been studied through physicochemical proxies as well (e.g. Burnett et al., 2011; Hübener et al., 2006).

## 4. Conclusions

With all the information obtained in this compilation, it was possible to observe that in studies for climatic reconstructions using lake sediments, the choice of proxies is fundamental;

Proxies must be chosen according to their limitations, taking into account the characteristics of the lake, such as location, size and shape.

## 5. Acknowledgment

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