GLEON 21.5

Book of Abstracts

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Climate-induced limnological change in shallow lakes during the Little Ice Age

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One of the most important recent challenges is to understand how shallow lakes will respond to global warming, particularly in arid and semiarid regions. Since variations in precipitation can produce significant ecological changes due to changes in water level (WL) and chemical and physical water characteristics of the lake, understanding the effect of changes in climate in the past can help better to address the impact of climate warming in shallow lakes. Thus, we selected four Pampean shallow lakes (Puan, Los Chilenos, Sauce Grande, and La Salada) strategically located in a climatically sensitive transition zone from arid to semiarid to assess the main drivers and mechanisms of long-term ecological change. These lakes originated in the Late Holocene as temporary and clear water lakes, and at around ~910 to 480 cal. yr BP they changed to permanent with turbid waters, except by Puan, the most northern lake, that changed at ~20 cal. yr BP (1930 AD). The primary mechanism inducing the change was an increase in WL and the resuspension of the sediment due to increase in precipitation and wind intensity, most likely associated with the Little Ice Age (LIA). Puan was the exception, it changed only recently, after humid conditions returned after 1930 AD. This suggests that the LIA was not homogeneous in the Pampean Region; it was dry in and the eastern and northern Pampas (where Puan is located) and wet in the southern and western Pampas (where lakes La Salada, Sauce Grande, Los Chilenos are located).

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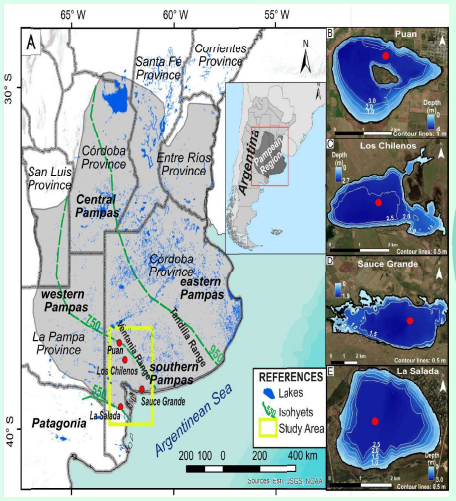
INTRODUCTION

One of the challenges in recent years is understanding how shallow lakes will respond to global warming, particularly in arid and semiarid regions. Since variations in precipitation can produce significant ecological changes due to changes in water level (WL) and chemical and physical characteristics of the water, understanding the effect of changes in climate in the past can help better to address the impact of climate warming in shallow lakes. To address this challenge, we studied the past limnological and ecological changes of four Pampean shallow lakes (Puan,Los Chilenos, Sauce Grande, and La Salada) as they evolved through the most recent climate global events: the Medioeval Climate Anomaly (MCA) and the Little Ice Age (LIA). These lakes are strategically located in a climatically sensitive transition zone from arid to semiarid, and did not have anthropogenic influences until the last 150 years ago.

STUDY AREA



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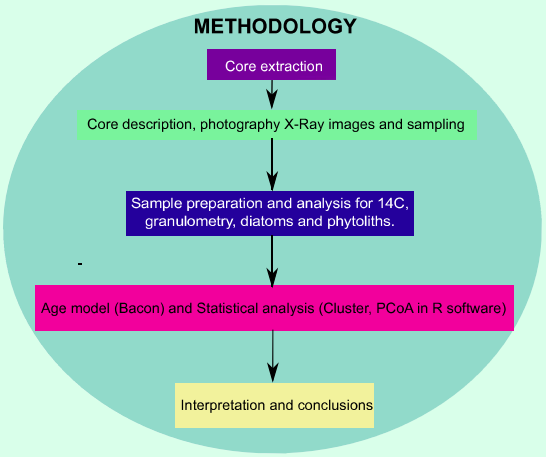

RESULTS AND INTERPETRATION

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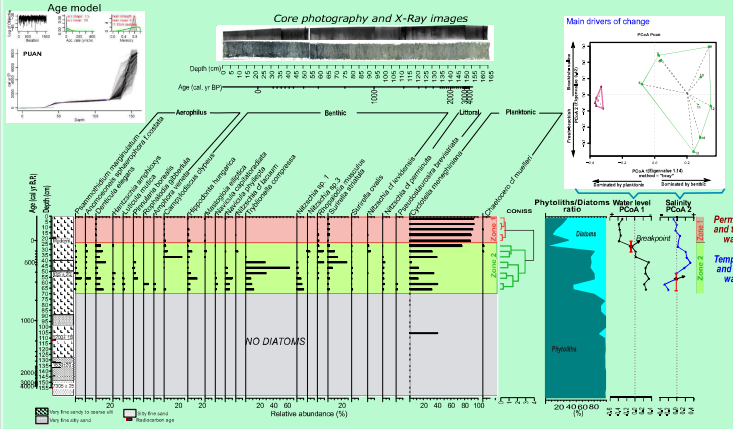

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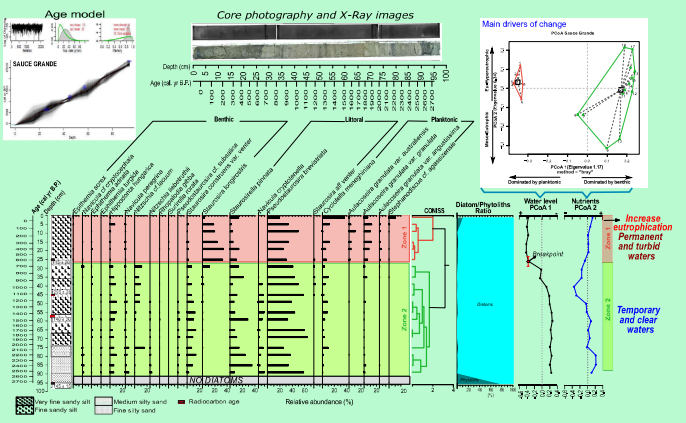
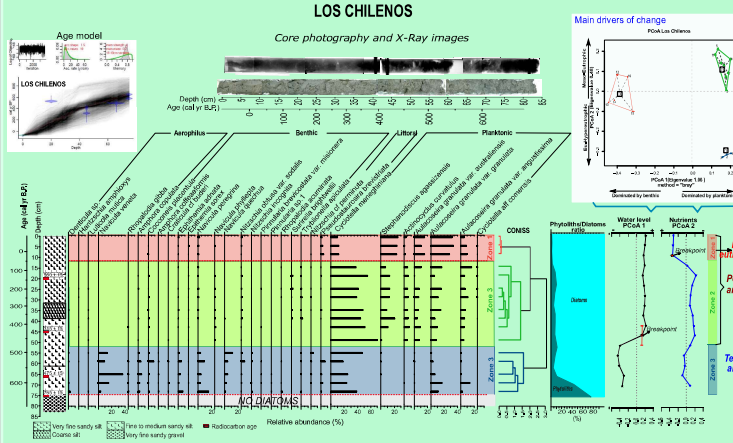
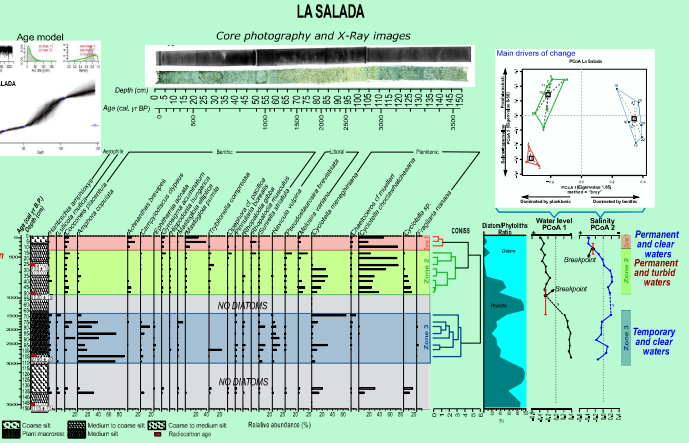


LOS CHILENOS



LA SALADA



CONCLUSIONS

These lakes originated in the Late Holocene being temporary and sustained clear waters. At around ~910 to 480 cal. yr BP they became permanent lakes with turbid waters. The primary mechanism of change was an increase in WL and in sediment resuspension caused by the increase in precipitation, wind intensity and wave activity as well brought about by the LIA. In Puan (the northernmost site), the change to permanent and turbid waters occurred only at ~20 cal. yr BP (1930 AD), which confirms other studies that suggest that the LIA was not homogeneous in the Pampean Region: it was dry in the eastern and northern Pampas and wet in the southern and western Pampas. Human-induced eutrophication was introduced only in the last decade.