

## ***Interactive comment on “Changing climatic and anthropogenic influences on the Bermejo wetland, through archival documents – Mendoza, Argentina, 16th–20th centuries” by M. R. Prieto and F. Rojas***

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Referi 1- They argue that “the novelty here is the archival use of maps to reconstruct changes in area and their linkage to natural archives of related climate changes and historical documents”. However, only four maps are provided, corresponding to the years 1802, 1861, 1896, and 1903. I have doubts on the possibility of reconstructing changes in area using only four maps.

Answer from authors: One major criticism is the use of only four maps. As we remarked

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in the text the objective of the paper was to base the work on data from historical documents supplemented by maps. It is possible that this idea has been poorly expressed, so it has led to some confusion. This has been clarified and corrected in the Methodology and Sources Section and throughout the text. According to the suggestions of the referees (one and two) we added other maps to the analyses who had been taken into account but had not been appointed (1789, 1802, 1861b, 1874 etc). But the main argument of this paper comes from the written historical documentation, not the maps. Thus the amount and accuracy of the maps while adequate, is not defining the results of the work. The historical maps are used to support and complement. We also added a map to the four already discussed (Ballofet, 1874) which has given greater continuity and depth to the analysis. Was also selected among the many maps consulted (see Appendix) nine maps before 1861 to show the stable situation of the swamp between 1794 and 1861. (fig 5)

Referi 1- “Anyway, maps would be complementary material supporting a reconstruction based on other type of proxy data (including documentary sources)”

Answer; There are no paleoenvironmental studies prior to this work on the Bermejo swamp, so we could not use other type of proxy data (no trees suitable for dendrochronological studies and we did not find anyone to do palynological or sedimentological studies, to complete the work)

Referi 1: “How have the authors used satellite images? “

Answer:.. Satellite images were used to georeference the old maps and from digital elevation models to calculate the direction and orientation of the slopes and contours that determine the formation of wetlands at the bottom. See Methodologie and Sources Section

Referi 1. “What about archaeological data?” The manuscript does not offer information on these data.

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Answer : There are very few archaeological works on the area: In Prieto and Chiavazza (2006) was used data from Rusconi explorations (1941), deposited in the Natural Sciences Museum of Mendoza. This archaeological material was dated for us by CO2 from 2500 BP to 1000 BP. No archaeological information exists on more recent native occupations in the site of the swamp.

Referi 1- "The grow and recession of the wetland were measured using the straight-line distance between two reference points –the Pedro del Castillo square (...) and the western edge of the wetland". This measure is not precise. How do the authors determine the location of the western edge of the wetland? Please, clarify.

Answer: We based on the reference given in the map of 1802 which places the western edge of the wetland in the Capilla de Nievas (Chapel of Nievas), which still exists in the same site as Capilla de Nieve (Chapel of Snow).

Referi 1 "What was this distance in 1896? Answer: Already added it in the corresponding place: the distance to the city was 4.43 km. We recognize that the maps have errors (especially that of Burmeister) Although we have considered also the changes in the distance with the Pedro del Castillo Square, we agree with referee 1 that is more convenient to measure the surface of the swamp in hectares to verify their changes and so we have done

Referi 1- Figure 2 is misleading. According to the authors, "effective drainage works only began in the 1860s". Therefore, you cannot compare the frequency of extreme high and low streamflows in the periods previous and subsequent to this date. Accepting the statements by the authors, since 1860 onwards anthropogenic influence was important, and the changes in the streamflow are not exclusively linked to climate variability. Although the authors quote the papers where this reconstruction is presented, it would be necessary to add a more clear description of the reconstruction procedure based on documentary sources. For instance, have they defined an ordinal index to account the events? Have they accounted the frequency of events per decade? Why

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decades and not other time periods?

Answer: Clearly it has been explained in the new version, in the section Methodology and Sources, the methodology used both for the reconstruction of the Mendoza River flow as used to reconstruct the pulses of the swamp (sources, procedures) We have changed the figure 2 , now number 3 (misleading according referi 1). It shows the annual series of Mendoza river flow smoothed with a period of 10 years. This has been easier to relate the increase or decrease the flow of the river with the rise and fall of the surface of the marsh. The ordinal index has only been used to count events increased or decreased flow of the Mendoza River. We were able to relate the flow rate increase per decade with each pulse of the swamp. These pulses expressed by flooding or increase the surface of the swamp in the documents were the generators of the complaints and proposals of the inhabitants of Mendoza city to initiate actions to dry them. These proposals were widely reported in the sources. By contrast, the years of lack of information on the subject in the documents would be pointing in turn the non-occurrence of the phenomenon. We have also taken in consideration decadal frequency (from 1601 when the series begins) because we found that at least until 1860 the increase or decrease in the surface of the swamp coincide with varying frequency of Mendoza river flow.

Referi 1- Please, include "(Fig. 3)" in page 3782, line 7, and "(Fig. 4)" in page 3783, line 15.

Aswer. It was included.

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