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Appendix: Methods, along with stratigraphic/chronologic data

Sedimentary Material

We obtained multiple, overlapping sediment cores from Lago Guanaco, using a 5-cm diameter modified Livingstone piston corer and a 7-cm diameter plexiglass corer to retrieve the water-sediment interface. The stratigraphy of the sediment cores was characterized by lithological descriptions, X-radiographs, and loss-on-ignition analysis following overnight drying at 105ºC. Sequential burns at 550ºC (2 hours) and 925ºC (4 hours) in a muffle furnace allowed quantification of the organic and carbonate content, respectively (Bengtsson and Enell, 1986). DR Figure 1 shows the results of the loss-on-ignition analysis of the Lago Guanaco record.

The palynological samples were processed following standard procedures (Faegri and Iversen, 1989) (KOH defflocculation, HF, Acetolysis) applied to 2 cc samples of lake sediments obtained from 1 cm-thick contiguous/continuous sections throughout the cores. The concentrates were mounted on slides using silicon oil (2000 cs), and were analyzed at 400x and 1000x magnification using a Leica DMLB2 stereomicroscope. The basic pollen sum for each level includes at least 300 pollen grains of terrestrial origin.

Radiocarbon Dating

The chronology of the sediment cores is controlled by AMS radiocarbon dates developed from bulk organic lake sediments (Supplementary Table 1). We calculated the weighted mean radiocarbon age whenever necessary, after determining that the replicate dates were statistically identical at 95% confidence level. Radiocarbon dates were converted to calendar years before present (cal yr BP) using the Southern Hemisphere calibration curve and the INTCAL04 calibration dataset for terrestrial samples included in the CALIB 5.01 program (Stuiver et al., 2005). We developed an age model (DR Figure 2) based on the radiocarbon dates listed on Table 1 using a cubic spline.

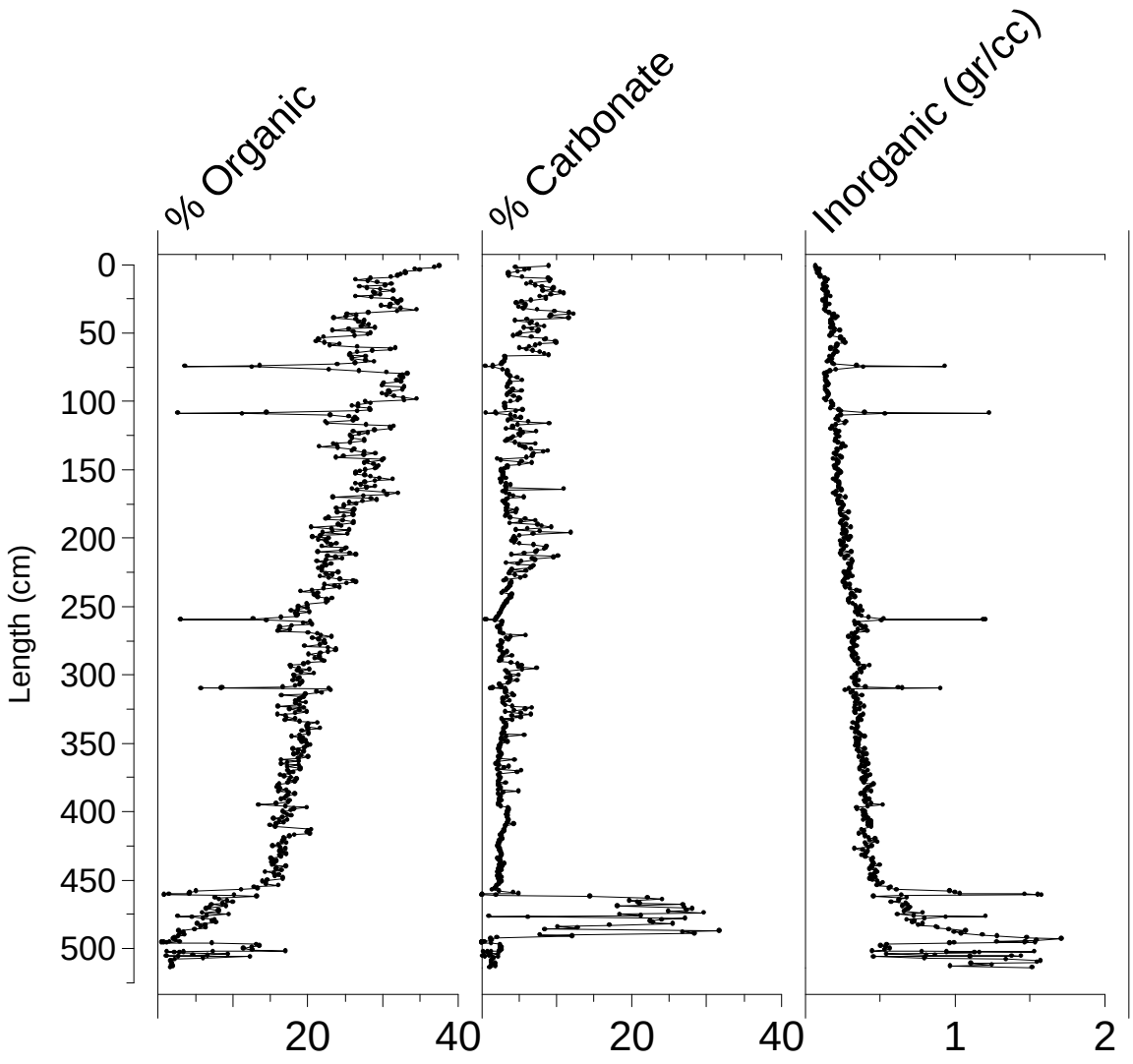

Figure DR1. Results of the loss-on-ignition analysis.

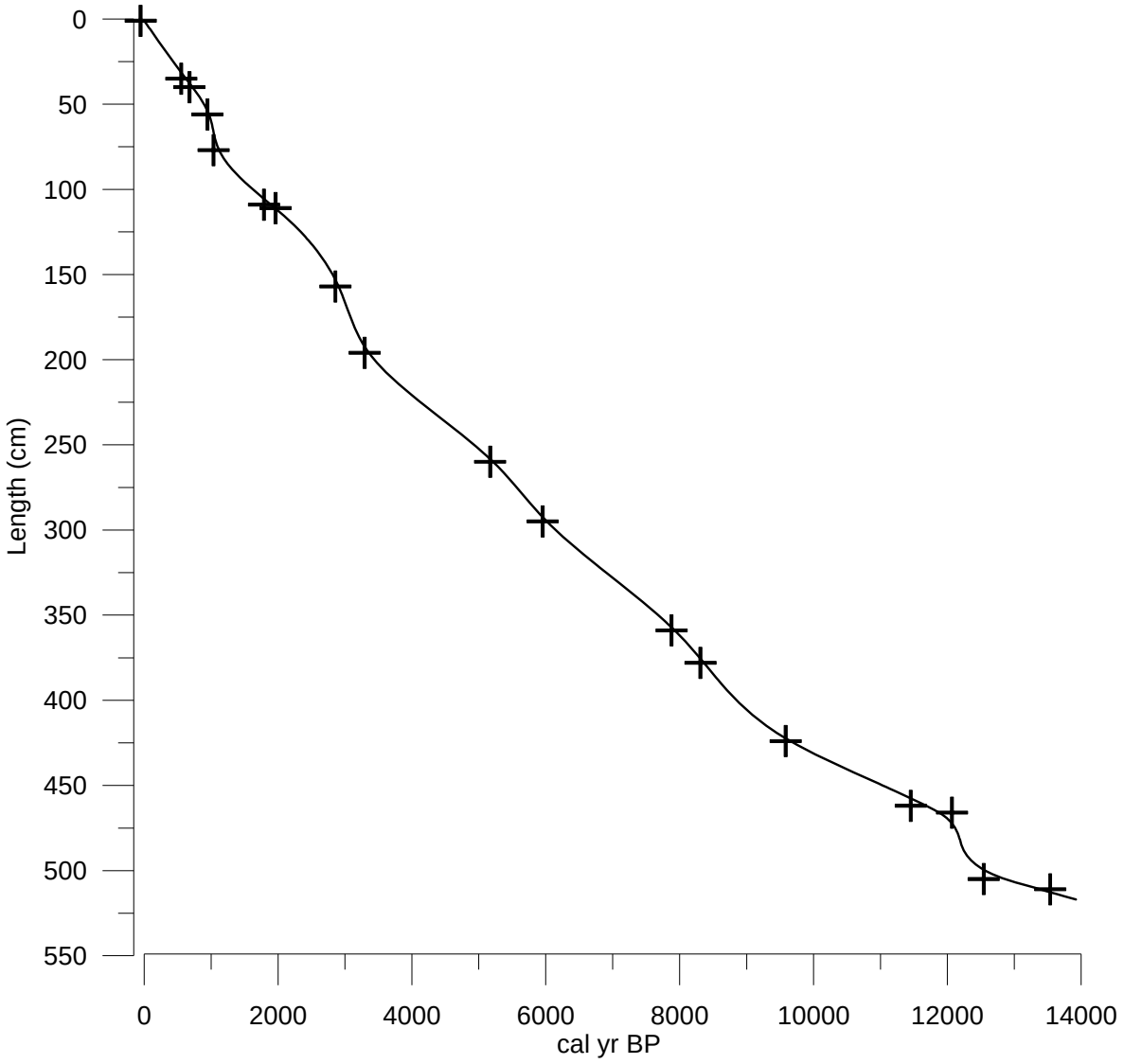

Figure DR2. Age model of the Lago Guanaco record.

Table DR1. Radiocarbon dates from sites discussed throughout the text. The median probability ages were obtained using the CALIB 5.01 program (Stuiver et al., 2005).

Laboratory code	Material dated	Length (cm)	^{14}C yr BP	± 1 σ	cal yr BP (median)
CAMS-107059	Mollusks	1	modern		-54
CAMS-115750	Gyttja	35	600	30	552
CAMS-131734	Mollusks	40	775	40	675
CAMS-131735	Mollusks	56	1080	35	943
CAMS-133251	Gyttja	77	1185	45	1035
CAMS-131264	Gyttja	111	1910	35	1789
CAMS-115803	Gyttja	113	2015	30	1962
CAMS-115748	Gyttja	159	2765	35	2856
CAMS-115751	Gyttja	198	3070	35	3293
CAMS-107056	Gyttja	264	4545	50	5169
CAMS-115752	Gyttja	299	5200	35	5953
CAMS-115753	Gyttja	366	7040	40	7879
CAMS-133254	Gyttja	385	7545	40	8311
CAMS-133255	Gyttja	431	8675	45	9585
CAMS-133252	Gyttja	469	9990	40	11,454
CAMS-131265 (*)	Gyttja	476	10,245	45	11,995
CAMS-107057 (*)	Gyttja	476	10,320	35	12,124
Weighted mean*	-	476	10,300	30	12,070
CAMS-133253	Gyttja	520	10,535	30	12,545
CAMS-131267	Gyttja	534	11,690	35	13,538
CAMS-107058	Gyttja	-	12,605	40	14,860

References Cited

Bengtsson, L., and Enell, M., 1986, Chemical analysis, *in* Berglund, B.E., ed., Handbook of Palaeoecology and Palaeohydrology, John Wiley & Sons, p. 423-451.

Faegri, K., and Iversen, J., 1989, Textbook of pollen analysis, John Wiley & Sons, 328 p.

Stuiver, M., Reimer, P.J., and Reimer, R.W., 2005, CALIB 5.0. [WWW program and documentation].