OGS Core Logging Lab - logging sediment cores in Lago Argentino (Brazo Sur), Argentina.

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Andrea Caburlotto[1], Mauro Caffau[1], Emanuele Lodolo[1]

1. OGS, National Institute of Oceanography and Applied Geophysics, laboratory of Core Logging, Trieste, Italy

1. Licence

2. Citation

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The data are supplementary material to:
Caffau, M., Lodolo, E., Donda, F., Zecchin, M., Lozano, J. G., Nasi, F., Bran, D. M., Tassone, A., & Caburlotto, A. (2022). Stratigraphic signature of the Perito Moreno ice-dammings during the Little Ice Age (southern Patagonia, Argentina). The Holocene, 32(3), 174-182. https://doi.org/10.1177/09596836211060496

Table of contents

3. Data Description

This dataset includes data used in the paper by Caffau ey al. (2022), focused on the water outburst occurring semi-periodically when the ice-dam formed by the external front of the Perito Moreno glacier collapses. The main objective of this research is to identify the flooding events that have been occurring regularly for at least 100 years in connection with the formation of the Perito Moreno glacial dam between Lago Argentino and Brazo Sur. These events lead to a rise in the water level in the Brazo Sur and thus to the formation of new strandlines. Instead, evidence of previous events has been only indirectly provided by dendrochronology analysis (Aniya and Skvarca, 2012; Guerrido et al., 2014). Therefore, the identification of old strandlines is a good clue to link the periodic flooding to the dynamics of the glacier, the latter being directly linked to the influences of climatic and environmental variations, especially over the last 100 years.

During the research campaign in the Perito Moreno area in November 2018, 10 sediment gravity cores were collected in the Brazo Sur along a transect at water depths ranging from 10 to 6 m using a 4.5 cm diameter gravity corer 'KC Kajak Sediment Sampler' Model 13.030.

Table 1: Sampling locations

Core	Length (cm)	Water depth (m)	Latitude (°N, WGS 84)	Longitude (°E, WGS 84)
BS18-1	43	6,7	-50.559778	-72.877111
BS18-2	47	5,5	-50.558889	-72.878279
BS18-3	47	9	-50.552639	-72.868000
BS18-4	65	3,5	-50.550444	-72.867278
BS18-5	64	7,5	-50.551250	-72.867583
BS18-6	61	4,8	-50.551222	-72.863556
BS18-7	53	9,3	-50.554311	-72.870080
BS18-8	68	3,4	-50.539361	-72.867278
BS18-9	59	4,4	-50.540611	-72.868444
BS18-10	55	5,2	-50.549361	-72.868028

Sediment cores were analysed at the Core Logging Lab, which offers a non-destructive mode of measurement on a fully automated system. It provides high-resolution whole-core and split-core logging data with sampling measurements at 1 cm–1 mm resolution. Core-scanning included:

1. CAT-scan radiographs performed prior to core opening;
2. high-resolution digital photos;
3. Magnetic Susceptibility analyzed at 1 mm.

The analysis have been carried at OGS and University of Trieste Core Logging Lab. All 10 cores were subjected to X-ray analysis and, after opening by cutting along the length, were photographed and the magnetic susceptibility was recorded.

The radiography and X rays on the sediment cores provided the evidences of floodings events and brighten levels (millimeter scale) in some cores, and different stratigraphic units. The magnatic susceptibility allowed to identify the brighten levels as ash layers.

Detailed descriptions of the experimental apparatus and experimental procedures can be found in the paper to which this dataset refers. Here we present:

- Processed X rays digital images
- High resolution digital photos
- Processed Magnetic susceptibility data

3.1.Sampling Methods

All the instruments (Multi Sensor Core Logger, GeoscanLinescan Imaging and X rays) scan the cores in a non-destructive mode of measurement.

3.1.1. Radiography acquisition

The Core Logging Lab is equipped with the Geotek® Standard X-Ray CT system.

Visually flat images can be created from scanned whole or split cores using software corrections. Data from the 14-bit digital flat panel is output to the user as 16-bit grayscale TIFF images with a typical resolution of 120 microns; these images can easily be converted to JPEG or other formats.

3.1.2. Geoscan Linescan Imaging acquisition

The Geoscan provide high resolution photography of sediment cores collected by using a digital camera with a dedicated lighting system.

Images can be collected over the full core width between 100 and 1000 lines per centimeter, corresponding to 100 and 10 micron pixel sizes, respectively. Pixel sensor: 1x5K CCD ADC resolution: 14 bits per colour channel MAX pixel rate: 3.2M pixel/sec MAX scan rate: 200 lines/sec Down core res: up to 10 microns

Acquisition parameters
Lens, Canon 50 f 1.4; Lighting and B&W calibrated in AUTO mode.

3.1.3. Magnetic susceptibility acquisition

Bartington point sensor (on split cores) giving 5% calibration accuracy. Acquisition every 1 millimeter.

3.2.Analytical procedure

X ray Acquisition parameters
The setting has been calibrated at the beginning of the analysis and used for all the cores, in order to equalize the gray-scale values:

Source set-up: Voltage 92 kV, Current 235 uA

Detector set-up: Frame rates 5; frame to average 5; acquisition time per image 1 sec.

Resolution: 167 pixel/cm

Imaging acquisition parameters
Lens, Canon 50 f 1.4; Colour Balance: high calibration R 90%; G 90%; B 90% (neutral grey-18%-standard calibration card), low calibration R 0%; G 0%; B 0% (cap on the lens); Resolution 250 pixel/cm; Exposure time: 10 sec; Aperture: 2.3; Auto focus.

Magnetic Susceptibility acquisition parameters
The Barmington MS2E sensor is electronically calibrated to measure a single standard of stable iron oxide tested and analyzed by Bartington:

Standard sample: 4,14 * 10^{-6} CGS – datum acquisition: 4,15 * 10^{-6} CGS

Eventually spikes were eliminated.

3.3.Data Processing

All the lengths were standardized. Magnetic Susceptibility and Photography don’t need processing.

3.3.1. Radiography Processing

Imaging processing filters have been applied to visually enhance cores features and structures making them more distinct and easier to identify. The image processing included:

- Contrast adjustment (using intensity histogram),
- Virtual compensator: compensates for the variation in thickness across the cores,
- Gaussian filter: applied to images to create smooth final images.

4. File description

Table 2: File inventory

ZIP Folder	Folder size	File type	File name	Figure in Caffau et al. (2021)	Content
			2025-020_Caburlotto-et-al_Data-description.pdf		Description of data and methods
2025-020_Caburlotto-et-al_Maps	2.8 MB	Figure	Geographic-area.png	Fig.1	Location map and bathymetry of the study area. (a) General map of the Perito Moreno region with the different arms composing the Lago Argentino. The transparent red inset indicates the location of the study area. (b) The eastern Brazo Sur inlet where the three cores have been recovered; bathymetry is taken from Lodolo et al. (2020) and Lozano et al. (2020).
			BS18-Core-sites.jpg		Location of the 10 BS18 cores in the Brazo Sur
2025-020_Caburlotto-et-al_Photography	126.5 MB	Photo	Imaging-BS18-XX.jpg		High resolution Photography of BS18 cores. XX =-number of core
2025-020_Caburlotto-et-al_X-Ray	37.5 MB	Radiography Images	X-Ray-BS18-XX.jpeg		Radiography of BS18 cores XX = number of core
2025-020_Caburlotto-et-al_Magnetic Susceptibility	157 KB	Data	MS-BS18-XX.csv		Data of Magnetic Susceptibility on cores at 1mm interval (MS1). Magnetic Susceptibility unit: SI x 10^-5 XX = number of core

References

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