

---

# Contents

---

<b>Acknowledgements</b>	<b>i</b>
<b>Summary</b>	<b>ix</b>
<b>Résumé en Français</b>	<b>xi</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Lake sediments as paleoenvironmental archives . . . . .	2
1.2 Study Site: Laguna Potrok Aike . . . . .	3
1.2.1 Why study Southern South America? . . . . .	3
1.2.2 Geological and climatic setting of Laguna Potrok Aike . . . . .	6
1.2.3 Previous studies . . . . .	7
1.3 PASADO Project . . . . .	8
1.4 Aims of this work and thesis outline . . . . .	13
<b>2 The diatoms of Laguna Potrok Aike</b>	<b>15</b>
2.1 Introduction to diatoms . . . . .	15
2.2 Diatoms in paleolimnology . . . . .	18
2.3 Diatom diversity in Laguna Potrok Aike . . . . .	21
2.3.1 Modern and subfossil diatom flora . . . . .	21
2.3.2 <i>Cymbella gravida</i> sp. nov. Recasens & Maidana . . . . .	25
2.4 The PIPA-PASADO Diatom Project . . . . .	35
<b>3 PASADO Core-Catcher record</b>	<b>37</b>
3.1 Introduction . . . . .	38
3.2 Geographical and climatic setting . . . . .	39
3.3 Sampling and analytical methods . . . . .	40
3.3.1 Drilling operations and sampling . . . . .	40
3.3.2 On-site field laboratory analyses . . . . .	41

---

3.3.3	Off-site laboratory analyses . . . . .	42
3.4	Results . . . . .	44
3.4.1	Lithology and core correlation . . . . .	44
3.4.2	Chronology . . . . .	47
3.4.3	Geochemistry . . . . .	48
3.4.4	Magnetic mineralogy and grain size . . . . .	49
3.4.5	Pollen . . . . .	52
3.4.6	Diatoms . . . . .	53
3.5	Discussion and interpretation . . . . .	56
3.5.1	Sedimentology . . . . .	56
3.5.2	Paleoenvironmental implications since the late Pleistocene . . . . .	59
3.6	Conclusions . . . . .	64
<b>4</b>	<b>SALSA record</b>	<b>65</b>
4.1	Introduction . . . . .	66
4.2	Regional setting . . . . .	68
4.3	Materials and Methods . . . . .	70
4.4	Results . . . . .	71
4.4.1	Chironomids . . . . .	71
4.4.2	Diatoms . . . . .	74
4.5	Discussion . . . . .	76
4.5.1	Laguna Potrok Aike . . . . .	76
4.5.2	Comparison with other studies in the area . . . . .	80
4.6	Conclusions . . . . .	80
<b>5</b>	<b>PASADO composite core diatom record</b>	<b>83</b>
5.1	Introduction . . . . .	83
5.2	Regional setting . . . . .	85
5.3	Materials and Methods . . . . .	87
5.3.1	Field methods, sediment composition and chronology . . . . .	87
5.3.2	Microfossil analysis . . . . .	87
5.4	Results . . . . .	88

---

5.4.1	Chronology . . . . .	88
5.4.2	The diatom record . . . . .	89
5.5	Discussion . . . . .	97
5.5.1	Stratigraphical record and paleoproductivity . . . . .	97
5.5.2	Paleoclimatic and paleoenvironmental implications . . . . .	99
5.5.2.1	Full Glacial to LGM conditions (DZ1-5) . . . . .	99
5.5.2.2	Late Glacial to Holocene transition (DZ6-7) . . . . .	104
5.5.2.3	Early Holocene to present (DZ8-9) . . . . .	106
5.6	Conclusion . . . . .	107
<b>6</b>	<b>Diatom record and Silica dissolution</b>	<b>109</b>
6.1	Introduction . . . . .	109
6.2	Observations . . . . .	110
6.2.1	Valve Dissolution . . . . .	111
6.2.2	Water and sediment parameters . . . . .	112
6.3	Hypothesis and Discussion . . . . .	113
6.4	Concluding remarks . . . . .	115
	<b>Conclusions and Outlook</b>	<b>117</b>
	<b>Bibliography</b>	<b>123</b>
	<b>Appendix A Sampling methods</b>	<b>141</b>
	<b>Appendix B Diatom Data - Species</b>	<b>143</b>
	<b>Appendix C Diatom Atlas - Light Microscopy (LM)</b>	<b>153</b>
	<b>Appendix D Diatom Atlas - Scanning Electron Microscopy (SEM)</b>	<b>161</b>