Late Quaternary diatom diversity in tropical Andean lakes: calibration and interpretation of core data

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The diatom stratigraphy from the tropical Andean lakes Titicaca and Junin, suggests wet climatic conditions in Glacial and late-Glacial times. However, drastic changes in diatom composition in the Altiplano by the mid-Holocene, indicate a period of extensive aridity. In order to assess paleo-environmental conditions from the diatom record, a set of modern samples from diverse biotopes were analyzed together with autoecological information. Possible relationships between relative water levels and salinity clearly emerge from these assemblages.
In Lake Titicaca, planktonic diatom samples present a low diversity assemblage with dominance of the taxa *Fragilaria crotonensis, Aulacoseira granulata, Cyclotella andina,* and *Cyclostephanos tholiformis* in the surveys retrieved from 1996 to 1998. Neritic and terminal watershed samples contained a greater diversity with dominance of pennate taxa. Littoral submerged macrophytes bear a interesting epiphytic diatom assemblage composed predominantly by the species *Achnanthidium minutissima* and *Cocconeis placentula* with accompanying taxa such as *Amphora veneta, Cyclotella meneghiniana, Encyonema minuta, Fragilaria crotonensis, Navicula veneta,* and *Nitzschia palea.* A sole moss sample with mucilaginous epilithic component from a spring stream, bears as dominant taxa the species *Achnanthidium minutissima, Amphora inarensis,* and *Nitzschia frustulum.* Riverine plankton tows are predominantly composed by *Achnanthidium minutissima, Melosira varians, Nitzschia palea,* and *Reimeria sinuata,* with the accompanying taxa *Diatoma vulgaris, Epithemia sorex, Navicula capitatoradiata, Nitzschia dissipata, Nitzschia liebetruthii,* and *Nitzschia perminuta.* Surface sediment analyses provide a powerful tool to establish the transition between benthic-dominated to pelagic-dominated assemblages (Fig. 1). This transitional range is found between 25m to 35m in the Chucuito sub-basin.
Moreover, autoecological data from dominant species from lakes Titicaca and Junin (Table 1) is an indication for water chemical composition such as salinity and alkalinity.

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Table 1. Basic ecological data of dominant diatom taxa in tropical Andean lakes

Lake Titicaca	Habitat/life-form	Salinity: optimum (range) (g/L)	pH	Alkalinity (meq/L)
Aulacoseira granulata	Planktonic[1]	1.03 (0.49-2.18)[9]	6.9-9.8[3]	1.4-68[3]
Cyclotella andina	Planktonic[4]	TDS: 0.85[4]	8.6[(4)]	ND
Cyclotella meneghiniana	Littoral, planktonic[1]	3.38 (1.16-9.86)[9]	7->9.5[3]	2-<100[3]
Cyclotella stelligera	Littoral, planktonic[1]	oligohalobic[1]	6-<8.5[3]	<2-<10[3]
Cyclotella pseudostelligera	Littoral, planktonic[1]	oligohalobic[1]	6-<8.5[3]	<2-<10[3]
Chaetoceros muelleri	Pelagic[6]	19.72 (3.17-122.74)[2]	7-<9.5[3]	10-<100[3]
Fragilaria crotonensis	Pelagic[6]	0.18 (0.01-2.75)[2]	ND	ND
Pseudostaurosira zeilleri	Episammic[5]	5-6 ‰[5]	<6->9.5[3]	<2->10[3]
Tabularia tabulata	Epiphytic[7]	0-10‰[5]	ND	ND
Lake Junin				
Cocconeis placentula	Littoral, epiphytic[1]	0.22 (0.05-0.95)[2]	<6-<9.5[3]	<2-<10[3]
Cyclotella stelligera	(See above)	-	-	-
Denticula elegans	Littoral[8]	8.92 (8.78-9.06)[9]	ND	ND
Gomphonema pumilum	Littoral[1]	oligohalobic[1]	6-<8.5[3]	<2-<100[3]
Staurosira construens var. *venter*	Littoral, planktonic[1]	0.17 (0.02-1.50)[2]	7->9.5[3]	ND

1= Gasse (1980), 2= Cumming et al. (1995), 3= Gasse (1986), 4=Theriot et al. (1985), 5= Intercalibration Baltic Sea, vol. 5 (1998), 6= Idem vol. 4 (1996), 7= Idem, vol. 1 (1993), 8= Patrick & Reimer (1975), 9= Fritz et al. (1993),

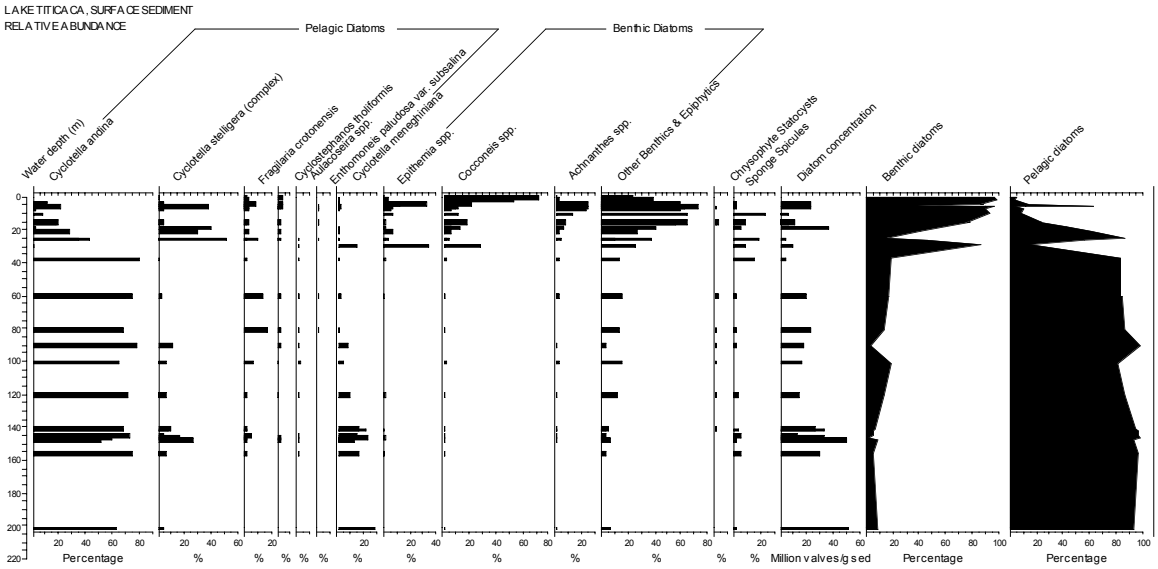

Fig. 1. Relative Abundance of selected diatom taxa in surface sediments. Samples are from several transects in Lake Titicaca's Chucuito sub-basin.