

Late Holocene environmental changes in a mesotidal estuary from Patagonia, Argentina

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Two sediment records from the lower valley of Negro River, Patagonia, Argentina (41°01'S; 62°47'W) spanning for the last 2000 cal yrs BP were analyzed according to diatoms and sediments contents. The river originates at the junction of the Neuquén and the Limay Rivers, Northern Patagonia, and discharges more than 1000 m³/s to the South Atlantic Ocean. Mesotidal conditions dominate at the inlet (2.95 m) affecting the lower valley (about 20 km) where salinity decreases drastically in the last 2 km. Fossil diatom assemblages and grain size were studied from two cores located at 1.5 km (Villarino site) and 12 km (Criadero site) from the inlet. Samples for modern diatom analyses were collected from the littoral zone at eleven sites along the river. Physical and chemical variables were quantified representing the maximum heterogeneity along the aquatic environment. Turbidity, salinity, conductivity, pH and temperature data were obtained in situ during summer and winter. In addition, a surface sediment sample was taken for grain size analysis and organic matter content, and water samples were taken to analyze nutrients and major ions following standard methods. The diatom content of modern sediment samples were studied in order to achieve ecological information useful as modern analogous for Patagonian rivers. Diatom zones were characterized by constrained incremental sum of squares cluster analysis (single linkage, Euclidean distance) in the fossil sequences. Fossil and modern diatom assemblages were compared with Detrended Correspondence Analysis (DCA). A total of 77 samples (modern and fossils) were analyzed and more than 200 taxa were identified. Diatom assemblages showed distinct abundance patterns in relation to salinity with a shift from communities dominated by marine/brackish taxa in lower sites to communities dominated by freshwater taxa in the middle and upper course of the river. The record of Criadero core (12 km from the inlet) began 2000 cal yrs BP with a shallow vegetated brackish/freshwater environment represented by *Surirella brebissonii*, *Epithemia adnata* and *Rhopalodia gibba*. The environment evolved gradually into marine conditions with dominance of *Paralia sulcata*, *Delphineis surirella*, *Raphoneis amphicerus* and *Cymatosira belgica* (tidal channel). Finally, marine brackish aerophilous taxa indicate the development of a saltmarsh. Villarino core (1.5 km from the inlet) represents the infilling of the estuary during the last 1300 cal yrs BP with the dominance of the marine/brackish tychoplankton taxa *Paralia sulcata*. The fossil assemblages of the two studied sequences showed similarity with modern assemblages of the lower valley of the river. Considering the strong influence of salinity changes on diatom assemblages, tidal effects are the main controlling factor for the composition and distribution of diatoms along mesotidal estuaries from Patagonia. The knowledge of palaeoenvironmental conditions derived from fossil diatom assemblages is very important to infer man-made changes in coastal areas and can be used as reference for the assessment of recent coastal changes (dredging, harbour construction, flood control improvements, pollution).