



Effect of climate changes on the depositional architecture of the Holocene Paraná Delta

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The best examples of changes on stratigraphic architecture are given by the present day geomorphology of some depositional settings. We show here how climatic changes strongly influenced on the depositional processes occurring on the Paraná Delta and as a result, it is possibly to observe today an impressive change in some external geomorphologic characteristics. Although this delta, enclosed in the La Plata estuary is subjected to a high degree of surface reworking, the described geomorphologic characteristics show the existence of significant climate changes. Deltas are rapidly depositing environment, and this particular one grows at a rate of $2 \text{ km}^2/\text{year}$, thus they are extremely well suited as a geo-chronometer. The Paraná Delta shows that it was a fluvial-dominated, highly constructive delta since the Holocene highstand locally dated at 6.2 Ka, until it changed abruptly at c. 5.3 Ka, where it started to show low-separated coastal ridges. These ridges developed continuously although not regularly, amounting a total of 330 ridges, until they rapidly disappeared near 1.7 Ka. The Paraná Delta after 1.6 Ka is again highly constructive but its mode differs from bird-foot deltas as it builds islands usually due to stranded floating vegetation that serves to trap suspended sediment. Within this epoch (1.6 Ka to present) it is possible to recognize a set of c. 10 minor coastal ridges. It is clear that these environmental changes represent the increased wave action which in the case of the La Plata estuary, have to be related by local winds. As it is well known, wind is usually enhanced during glacial epochs due to the higher temperature and barometric gradients, and in this case our conclusions fit the findings on South American tropical ice cores that determine a local glacial growth from c. 5.2 Ka till c. 2.0 Ka. Accordingly, we interpreted the isolated set of ridges (still undated) as the local record of the LIA. The Paraná Delta thus helps to understand the characteristics of the climate during the Holocene (humid or dry) and to set boundaries to the different climate periods. It also explains the scarcity of anthropological remains in the Pampas during the time span from 5.2 to 2.0 Ka, as the entire region would be turned into semidesertic conditions, as also indicated by independent studies the growth of a mid-Holocene sand sea in the Pampas.