ADDITIONAL INFORMATION DERIVED FROM SHELL-MIDDENS IN THE RELATIVE SEA LEVEL RECONSTRUCTION DURING THE LAST 7,000 YEARS ALONG THE STATES OF PARANÁ AND SANTA CATARINA COASTAL PLAINS *

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Obviously a shell-midden is not the best evidence for ancient sea level reconstruction in the space and in the time. However, within coastal areas subjected to a submergence followed by an emergence, interesting and even precious information can be supplied by shell-middens when other data are very scarce. Therefore, position and fluctuation trend of the relative sea levels can be derived from the following information:

a) Geographic situation of the shell-midden in relation to the present sea or lagoonal area;

b) Nature and age of the substrate on which the shell-midden has been constructed;

c) Altitude of the shell-midden substrate in relation to the present high-tide level;

d) Times relative to beginning and end of site occupation, as well as, possible moments of abandonment and reoccupation;

e) $\delta^{13}C_{(PDB)}$ values of the carbonate shells;

f) Dominant species of the mollusk shells;

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g) Size of the shell-midden, etc.

Moreover, neither all shell-middens do not derive interesting information and only one dating more frequently will not be enough.

Very numerous shell-middens have been found around the present bays and paleobays of Paranaguá, Guaratuba and São Francisco, as well as in the Florianópolis island and near the town of Laguna. The information derived from the shell-middens, associated with other data, allowed us to establish with great precision the general trends of the relative sea level changes during the last 7,000 years along the States of Paraná and Santa Catarina coastal plains.Then, the shell-middens of Gaspar, Cacatu, etc., due to their geographic situation, could have been built only during the maximum lagoonal extent between 5,300 and 5,000 years B.P., in perfect agreement with the 5,100 years B.P. maximum of other sectors of the Brazilian coast.

The relative sea level drop after 5,100 years B.P. has been ratified by dating shell-middens whose substrate is constituted by lagoonal deposits situated in front of sandy Pleistocene terraces. The period of low sea level between 4,000 and 3,600 years B.P. has been confirmed by a 3,920 $\pm$ 190 years B.P. old shell-midden of the Guaratuba area, whose substrate is below the present sea level. A high sea level period between 3,600 and 3,000 years B.P. has been ratified comparing the $\delta^{13}C_{(PDB)}$ values of carbonate shells from this shell-midden with that situated at a short distance. Similarly, the altitude of the Holocene sediments, forming the substrate of some shell-middens, supplied the upper limit which was not crossed by the highest relative sea-level. Finally, the second period of low sea level between 3,000 and 2,500 years B.P. has been confirmed by the information from the Carniça shell-midden located near the Laguna area.