

## CHARACTERIZATION OF JAGUARIBE ESTUARY SEDIMENTS BY SEM/EDS.

Miguens, F.C.<sup>1</sup> De Oliveira, M. L.<sup>1</sup> De Rezende C. E.<sup>1</sup>, Marins, R.V.<sup>2</sup>, Lacerda, L. D.<sup>2,3</sup>

<sup>1</sup>Universidade Estadual do Norte Fluminense Darcy Ribeiro

<sup>2</sup>Instituto de Ciências do Mar - Universidade Federal do Ceará

<sup>3</sup>Departamento de Geoquímica - Universidade Federal Fluminense

Interest in calcium carbonate formation and dissolution in the ocean has increased because of the central role these reactions will play in the ocean's response to the increasing partial pressure of carbon dioxide ( $pCO_2$ ) in the atmosphere. Calcium carbonate is an important and often dominant component of marine sediments. These sedimentary rocks are made up of the carbonate minerals calcite ( $CaCO_3$ ) and dolomite ( $CaMg(CO_3)_2$ ). Although, aragonite ( $CaCO_3$ ), magnesite ( $MgCO_3$ ), siderite ( $FeCO_3$ ), rhodochrosite ( $MnCO_3$ ) and kutnahorite ( $CaMn(CO_3)_2$ ) are also common carbonate minerals in the marine environments. Much of the calcium carbonate that is formed is dissolved in the water column and in sediments through processes collectively known as diagenesis. The primary source of marine carbonate minerals has shifted from abiotic precipitation to biogenic sources. The biogenic sources are primarily the disintegration of the skeletons of benthic organisms, such as corals, echinoids, mollusks, benthic foraminifera, and coralline algae [1]. The objective of this paper is to investigate the morphology and elemental distribution of carbonates in Jaguaribe estuary sediments under SEM/EDS. Sediments were collected using PVC tubes - diameter 50 mm - length 150 cm - at  $4^{\circ}25'45''$  S and  $37^{\circ}46'11''$  W and  $4^{\circ}40'20''$  and  $37^{\circ}49'10''$ . Lyophilized samples were collected from 3-8, 23-28, 43-48, 73-78, 83-88 cm depths based on previously determined carbonate range according to the literature [3]. Samples were prepared for analytical microscopy by dispersing 100 mg of each dry sample on aluminum supports covered with carbon tape and subsequently covered with carbon [2]. Data were obtained with a DSM 962 ZEISS operating at 30kV and coupled to a microanalysis Link-Oxford apparatus using ultrathin Be window, which had been calibrated with a 99.99% Cu stub. The size of the sediment particles varies from  $< 1 \mu m$  to 500  $\mu m$ . The largest particles (100 to 500  $\mu m$  length in major axis), small particles (10 to 50  $\mu m$  length in major axis) and microparticles ( $< 10 \mu m$  length in major axis) were observed in all sediment cores. The morphology of largest particles varies from typically biogenic origin (Figure 1) to non-biogenic origin (Figure 2). Biological particles were easily observed in 3-8 and 23-28 cm and rare in 73-78 and 83-88 cm sediment depth fractions. Calcium (Ca) and Oxygen (O) rich particles were predominant in biological particles. However, Potassium (K) and Magnesium (Mg) were also detected. Non-biogenic largest particles could be divided into two clusters. A cluster O/Si rich particles, representing on average, 50% of the largest particles. O/Si/Al/Fe rich particles - circa 30%, identified as aluminosilicates, were observed. Other aluminosilicates presented Iron (Fe), Calcium and Sulfur (S) were the predominant minor associated elements with these particles. Morphological differences were not detected among these particles. However, Potassium (K) and Calcium (Ca) did not show the same location in elemental maps. NaCl crystals and euhedral crystal, presenting Fe/S, were also detected as small and micro particles adhered to largest particles, respectively. The biogenic sources of sediment were easily identified by SEM but abiotic contribution remains unclear. On basis of these results, we believe that small and micro particles will reveal the main differences along sediment depth cores.

Acknowledgements: The authors are grateful to Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq - and Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro - FAPERJ - for financial support.

### References:

- [1] Morse, J. W., Arvidson, R. S., Lüttge, Chemical Review 107 (2007) 342-381
- [2] Bozzola, J. J., Russel, L. D., Electron Microscopy [2<sup>nd</sup> ed.] Jones and Bartlett Publishers (1999)
- [3] Loring, D. H., Rantalla, R. T. T. Earth Sci Rev 32 (1992) 235-283

