HEAVY METALS ANALYZED BY TOTAL EXTRACTION METHODOLOGY IN SEDIMENTS OF SEPETIBA BAY, SE, BRAZIL: THE PLUME OF CONTAMINATION FADING.

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ABSTRACT

The Sepetiba bay is a coastal lagoon separated from the ocean by a beach barrier located 60 km from Rio de Janeiro City. The aim of this study was to evaluate the concentration of Heavy Metals in the sediment in adition to assay the shift of the plume of contamination within the bay. The samples were collected all over the bay, analyzed for Cd, Zn, V, Cu, Cr, Co, Ni and Pb by total extraction methodology. The results show a variation of the plume of contamination from the North area of the bay to the southeast area of the bay coherent with the clockwise current movement within the bay.

Keywords: *Sepetiba Bay, Heavy Metals, GIS, Geochemistry, Sediments*

1. INTRODUCTION

Due to a rapid urban development the environmental has become source of great attention by the scientific community, either for management, conservation and others. Brazil has been suffering in recent decades a considerable environmental degradation due to lack of planning in the use natural resources and by the low capacity of the environment to absorb impacts engendered by the industrial progress a the urban growth. Most of the anthropogenic chemicals and waste material contribute to the degradation of aquatic environments. In the last 20 years Cd and Zn has been identified as the main contaminants of sediments in Sepetiba Bay, Rio de Janeiro, Brazil due a large Smelting Plant closed on 1996 (Barcellos & Lacerda, 1994), in addition to toxic substances released in the tributaries of the bay and by atmospheric deposition (Lacerda et al.1987; Pedlowsky, 1991). In order to evaluate the spatial distribution of pollutants, heavy metal (Cd, Zn, V, Cu, Cr, Co, Ni, and Pb) concentration was performed on bottom sediments of Sepetiba Bay.

2. MATERIALS AND METHODS

Sepetiba Bay is a semi-enclosed lagoon, 447 km² area, situated 60 km west of Rio de Janeiro City (Fig. 1). 90 samples were collected all over the bay using Van Veen and preparation included drying, sieving, total extraction methodology performed on the Activation Laboratories Ltd. – Actlabs in Canada. In order to georeference the sampling areas and to create contour maps, the ArcGis® software was used.

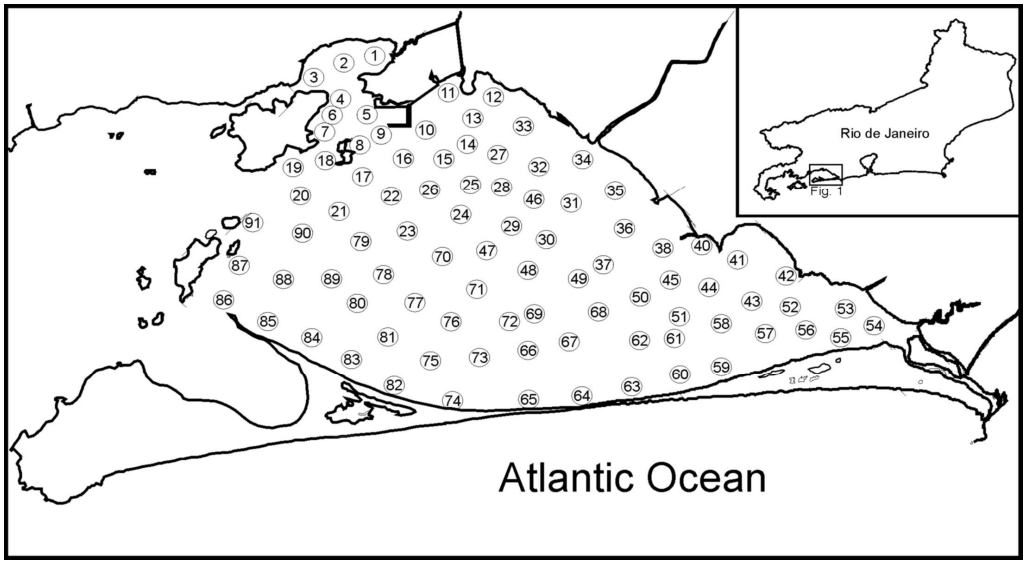

Figure 1 Location of Sepetiba Bay and the sampled sites

3. DISCUSSION

Pb presented higher values on the north area of the bay and close to the mouth of the rivers, with a wide distribution within the bay (Fig. 2). Cd had a maximum concentration on the north portion of the bay and few anomalies also near the rivers (Fig.2). Zn had the highest concentrations among all metals analyzed. It has the same distribution as Cd, with the higher value achieving 3440 ppm (near the extinct Zn smelting plant), and some anomalies on the East portion of the bay (Fig. 2). The geochemical results suggest a similar behavior for Pb, Cd and Zn in Sepetiba bay. Cu showed higher concentrations next to Restinga da Marambaia (Fig. 2). Co showed higher concentrations on the East portion of the bay (Fig.2). V showed high concentrations all over the bay like Pb (Fig. 2). Cr showed higher concentrations on the Eastern portion of the bay and next to the rivers mouths, and at last Ni showed a similar distribution between Cr and Pb, with a higher concentration at the same area of these elements (Fig. 2).

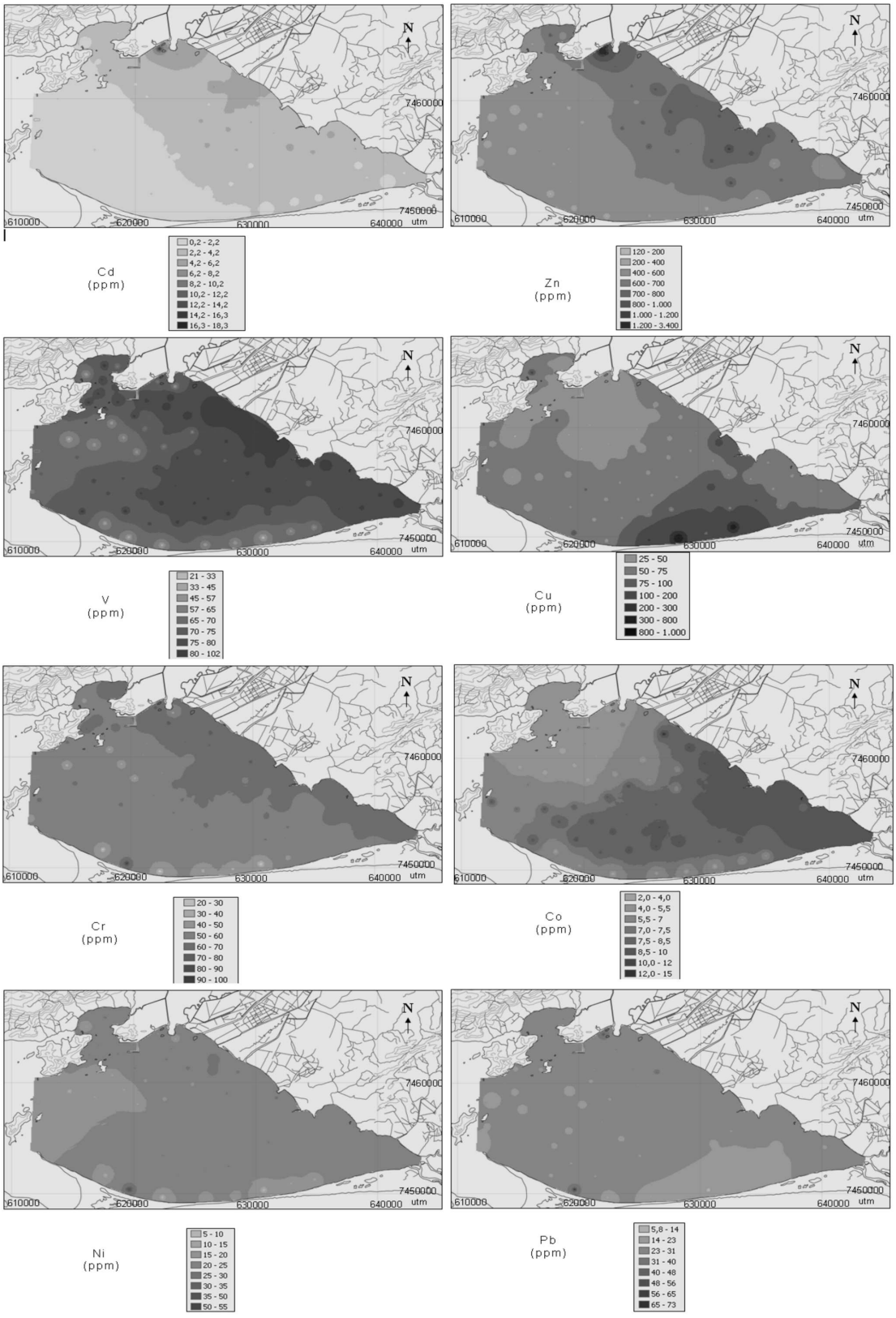

Figure 2 Georeferenced maps of heavy metals concentrations

4. CONCLUSION

The results reported in this study complement the literature with same analytical technique done in previous years. The spatial distribution of sediments emphasizes the transport of the metals from the North area of the bay, next to the main rivers and major sources of pollutants (Lacerda et al. 2002), to the SE area of the bay. In addition, as described in the literature, the sediments carriage of the bay is set by the riverine input until nowadays and the surface currents define the direction of the metal plume transport. The shift of the plume of contamination is better shown by the metal Zn, following the NW-SE currents. Cd has its distribution in 50% of the area of the bay while Pb and V showed a distribution all over the bay. Although the other metals analyzed in this study show concentrations bellow Cd, Zn and Cu, the fade of the plume of contamination is also evidenced.

5. REFERENCES

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