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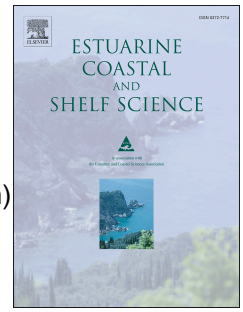

Abundance, distribution and bioavailability of major and trace elements in surface sediments from the Cai River estuary and Nha Trang Bay (South China sea, Vietnam)

S.E. Koukina, N.V. Lobus, V.I. Peresypkin, O.M. Dara, A.V. Smurov

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Abundance, distribution and bioavailability of major and trace elements in surface sediments from the Cai River estuary and Nha Trang Bay (South China Sea, Vietnam)

S.E. Koukina [a,] *, N.V. Lobus [a], V.I. Peresypkin [a], O.M. Dara [a], A.V. Smurov [b]

[a] P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences, Nakhimovsky Prospect 36, 117997 Moscow, Russia

[b] Physical Geography Museums of Moscow State Lomonosov University, Leninskye Gory 1, 119991 Moscow, Russia

*Corresponding author. Tel.: +74991291990; fax: +74991245983

E-mail address: skoukina@gmail.com (S.E. Koukina)

[a] Tel.: +74991291990; fax:+74991245983

Keywords: Vietnam, Nha Trang Bay, estuary, surface sediments, major elements, trace elements, bioavailable metal forms

Abstract

Major (Si, Al, Fe, Ti, Mg, Ca, Na, K, S, P), minor (Mn) and trace (Li, V, Cr, Co, Ni, Cu, Zn, As, Sr, Zr, Mo, Cd, Ag, Sn, Sb, Cs, Ba, Hg, Pb, Bi and U) elements, their chemical forms and the mineral composition, organic matter (TOC) and carbonates (TIC) in surface sediments from the Cai River estuary and Nha Trang Bay were first determined along the salinity gradient. The abundance and ratio of major and trace elements in surface sediments are discussed in relation to the mineralogy, grain size, depositional conditions, reference background and SQG values. Most trace-element contents are at natural levels and are derived from the composition of rocks and soils in the watershed. A severe enrichment of Ag is most likely derived from metal-rich detrital heavy minerals such as Ag-sulfosalts. Along the salinity gradient, several zones of metal enrichment occur in surface sediments because of the geochemical fractionation of the riverine material. The parts of actually and potentially bioavailable forms (isolated by four single chemical reagent extractions) are most elevated for Mn and Pb (up to 36 % and 32 % of total content, respectively). The possible