A geochemical approach to the Sado saltmarshes (Portugal)

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The Sado estuary develops ca. 20 km south of Lisbon and studies of its subtidal and intertidal sediments, (namely of marginal marshes - Malha da Costa, Faralhão, Carrasqueira, Alcácer) showed that upper estuarine (Alcácer) sediments yield a Zn/Al-normalized ratio up to 14x (channel) and 7x (marsh) higher than in all remaining areas [1, 2]. Zn is sourced in the Iberian Pyrite Belt terranes - exploited for ore since the Calcolithic - which are intersected by the Sado's watershed; weathering and lixiviation of waste-piles input inorganic carriers of Zn into the drainage system, the metal progressing downstream until reaching the high-salinity upper estuarine domain.

This motivated the sedimentological and geochemical study of a 2.7 m-long core taken from the Alcácer saltmarsh, to investigate the variatons in Zn and other heavy metals along time. The core consists of a monotonous accumulation of muddy sediment (coarse fraction <8%), with compatible values of Si (26-28%) and Al (~9%), high in organic matter (~7-10%) and $CaCO_3$-free, thus low (<0.5%) in Ca.

The vertical profiles of terrigenous elements are fairly invariant. K (1.7-1, 9%) and Ti (0.5-0.6%) usually associate with Al-silicates, and may be replaced by Rb (145-157 mg/kg) and Zr (129-161mg/kg), respectively, in those minerals; these elements and Al present identical vertical variation profiles. The elemental content in Zn decreases upcore (3200 to 443mg/kg) and the Al-normalized values range between 50×10^{-4} and 365×10^{-4}. The lowermost 6 cm of the core yielded Zn/Al $>100\times10^{-4}$. The contents of Cr, Ni, Cu and Pb are 95-153, 41-59, 91-228 and 44-73mg/kg, respectively. The vertical variation of the Al-normalized values of these metals show a slight increase of Cr and Pb upward and a clear decrease in Ni and Cu in the top meter.

The closure of several mines and rehabilitation of tailing areas should have decreased the supply of Zn to River Sado tributaries, and consequently in the lower reaches of the river. At this point it is not possible to indicate the factor responsible for the increment of Cr and Pb to the surface.

[1] Cortesão & Vale (1995) *Mar Pollut Bull* **30**, 34–37.
[2] Moreira *et al*. (2009) *J Coastal Res* **SI 56**, 1380–1384.

The plumbing system of the Ischia island: A physico-chemical window on the fluid-saturated and CO_2-sustained Neapolitan volcanism (Southern Italy)

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Ischia, a small island located 18 miles NW offshore Naples (Southern Italy), is a densely populated active caldera (last eruption 1302 A.D.). Melt inclusions in phenocrysts of poorly differentiated eruptive products constrain structure and nature of the Ischia deep magmatic feeding system. Volcanic products bear clear evidence for CO_2-dominated gas fluxing, under very oxidized conditions, and CO_2 enrichment in magma portions stagnating at major crustal discontinuities. Volatile concentrations require gas-melt equilibria between 3 and 18 km depth. At Ischia there is much less magma than that needed to directly supply the amount of released magmatic fluid. Comparison with data from the other nearby Neapolitan volcanoes (Procida, Campi Flegrei –CF-, and Somma-Vesuvius –SV-) highlights the pivotal role of deep fluids in originating the volcanism. Despite the compositional and eruptive style differences observed within the small extension of the Neapolitan Volcanic District, and the variable occurrence of mixing, crustal assimilation and fractional crystallization, the different kinds of volcanism are mostly linked by supercritical CO_2 fluids produced by the devolatilization of subducted terrigenous-carbonatic metasediments. Geochemical and isotopic differences among Ischia, CF and SV from one side, and Procida from the other one, reflect the tectonically controlled slab-derived fluids release and upraise trough the mantle wedge, that, in turns, control magma generation.