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Study of metal presence in the sediments of three different water bodies from the north of Portugal and its impact in Archaeal community

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Abstract

Background: Human impact on the planet's biomes has been rapidly increasing over the last decades [1]. In aquatic ecosystems, an active monitoring of the water and the sediments quality is already essential to assure its suitability for human use as well as to guarantee the health of the ecosystems [2, 3]. **Objectives:** This work focuses on the study of metals concentration in transitional water bodies (Ave estuary – 2 sites, Douro estuary – 3 sites; and Ria de Aveiro – 3 sites), and in the establishment of correlations with parameters to assess ecosystem's health based on the analysis of the less studied domain, the Archaea. **Methods:** Sediment samples were collected from the three target ecosystems. Metals concentration (Cu, Mn, Ni, Zn, Pb, Cr, Cd, As) was determined by flame atomic absorption and Archaea profiling was performed by 16S rRNA gene sequencing. The database was normalized for statistical analysis, namely for univariate (correlation matrix), and multivariate analysis (PCA, HCA). **Results:** The characterization of Archaeal community revealed the presence of 12 phyla (and several unidentified sequences). Regarding metals, Ave2 (upstream), showed high values of Cu, Mn, Zn, Cr and As, in Douro sites Cu, Mn, Zn and As were detected while in Ria de Aveiro As was the most abundant metal. Higher microbial Amplicon Sequence Variant (ASV) richness and Shannon's diversity index are related to the three sites of Ria de Aveiro, including a saltern site (≈55 PSU), which is the more extreme environment of all the sampling locations. The statistical analysis showed that in general, metals negatively affected the biodiversity of Archaeal community, with copper and chromium being the most relevant. **Conclusions:** The archaeal community in these target ecosystems is influenced by the metals present in their sediments.

Keywords: heavy metal; Archaea; aquatic ecosystems; metabarcoding

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