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Mercury flux evaluation to the atmosphere in a contaminated area (Esteiro de Estarreja)

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The Ria de Aveiro, more specifically the Largo do Laranjo area was subjected during more than four decades to industrial discharge rich in mercury (Hg) and is today severely polluted. It is estimated that during the decades from 50 to 90 it was discharged to the Ria about 27 tons of mercury and that approximately 74% of this is confined in the Largo do Laranjo.

With the objective to determine the mercury flux emitted to the atmosphere by sediments, water column and some autochthones plants from the Esteiro de Estarreja many samplings were performed with the application of dynamic flux chambers built to the effect.

The sampling was performed in the Esteiro de Estarreja and in the laboratory (Aveiro).

In the mercury flux evaluation in the interfaces sediment/air and water/air it was used a rigid dynamic flux chambers and in the interface plant/air was used a semi-rigid dynamic flux chamber.

The emission flux is calculated by a mass balance between the amounts of Hg in the air entering and exiting the chamber.

The total gaseous mercury (TGM) was sampled using traps constituted by steel tube with sand covered with gold closed with quartz wool. The mercury forms an amalgam with the sand, being later desorbed and analysed by atomic absorption.

In parallel with the mercury flux measurements were also performed sampling of the gaseous mercury in the ambient air.

The mercury flux obtained for the sediments of the Esteiro de Estarreja varied from -2197 to 4731 ng $m^{-2}h^{-1}$, reporting the negative flux at the end of the day; to the different species of plants the emission rates varied from -1,9 to 18 ng $g^{-1}h^{-1}$ depending on the species.

The flux obtained for the contaminated water column cannel varied from -290 to 960 ng $m^{-2}h^{-1}$, again with a negative flux after the sunset.

The mercury concentrations in the Aveiro air varied between 37 and 232 ng m^{-3}, while in the Esteiro de Estarreja varied between 54 to 2961 ng m^{-3}.