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Hg soil pollution around the Flix chlor-alkali plant

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Main mercury consumer in industrialized countries is the chlor-alkali industry. In Spain, this industry declares 2.54 tons of mercury emissions to the atmosphere per year, but the losses of mercury in this industrial process seem to be higher than this. In the next 15 years, these industries are going to make a technology change to a free mercury based technology.

This study has been applied to the Flix (Tarragona, NE Spain) plant, located very near the Ebro River. Local industrial activity started in the late 18th Century, being the first Spanish industrial precinct in activity. Technology used in this plant is obsolete, and produces important emissions to the atmosphere. Besides, it has also produced an important pollution problem in the Ebro River. The aim of this work is the characterization of mercury soil pollution around the oldest chlor-alkali plant (CAP), actually in process of decommissioning. For this porpoises, we provided data of mercury in soils and in olive oil leaves, in order to assess the extent of this pollution, and the consequences in terms of transferring to local agricultural biota.

We present data from two soils geochemistry surveys, one centered in the general area, and a second one centered in an anomalous area identified by the first survey, at the Ebro margins downstream the town area. A total of 126 surface soil samples were taken and analyzed for total mercury by means of a Lumex RA-915+ device with RP- 91C pyrolysis attachment. Soil-plant transfer was studied based on mercury contents in olive leaves, the most ubiquitous plant species in the area; these biological samples were thoroughly clean and freeze-dried before its total mercury analysis in a Lumex RA-915+ device with its RP-91c pyrolysis attachment.

Mercury contents in soils reach maximum levels in the vicinity of CAP (495 mg kg-1), much higher than baseline levels found in the area (0.18 mg kg-1, in average). These polluted soils are located near CAP and the riverbanks of Ebro meander, downstream the town area. Mercury seems to be partially available to plants, especially in the CAP surrounding area, where total mercury levels in olive leaves reach maximum values of 1.27 mg kg-1, and average concentration is 0.48 mg kg-1, higher than tolerable level for agronomic crops establish by Kabata-Pendias (2010) in 0.2 mg kg-1.

Although correlation coefficients between Hgsoil-Hgplants are low, is possible to characterize plant absorption by logistic curves.

Main conclusions of this work are: i) A fraction of mercury vapor emitted by CAP has been deposited on local soils by wet and dry deposition; ii) Mercury in local soils seems to be bioavailable for plants as highlights mercury levels in olive trees; iii) In this work we have identified risks areas with polluted soils.