

Background levels

V. Laperche – BRGM- France

To define the areas to be treated in priority, it is necessary to know the distribution of Hg on its territory. The presence of Hg may be related to: anthropogenic activities, atmospheric deposition and local background noise.

Background level in soil

Mercury is naturally present in the soils of French Guiana, where it can have two non-exhaustive origins (extracts from Grimaldi et al., 2001):

- The residual accumulation of mercury during the process of rock weathering and soil formation (this accumulation is a characteristic of oxysols or ferrallitic soils, formed in hot and humid climatic conditions, for very long periods);
- Natural atmospheric inputs of mercury (degassing of the earth's crust and oceans) likely to be retained by soil constituents, particularly tropical soils rich in metal oxyhydroxides.

The stock of mercury can, however, vary by an order of magnitude under identical conditions of geology and atmospheric inputs, depending on soil diversity. Oxysols are the richest because of their constitution (richness in metal oxyhydroxides) and their organization (high permeability, oxidizing conditions), favorable to the retention of mercury. In contrast, hydromorphic soils are poor in oxyhydroxides and clay and retain less mercury.

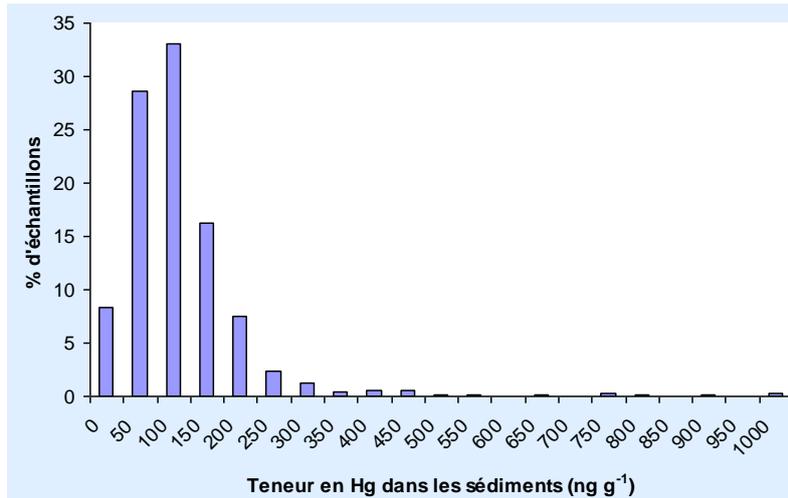
In these different environments, oxysols (which cover a majority of the landscape) are one of the main reservoirs of mercury. These are deep soils at the top of watersheds, with the source rock 20 or 30 meters deep. The mercury content of oxysols can reach 500 mg/t at the surface. The depth on which mercury is present reflects a very ancient accumulation (linked to the atmospheric precipitations and the age of these soils, of several million years). In contrast, hydromorphic soils located in valleys, have much lower levels between 20 and 50 mg/t.

Background level in sediments

A study of the regional distribution of mercury in sediments was conducted in French Guiana to provide informative mapping for decision-makers.

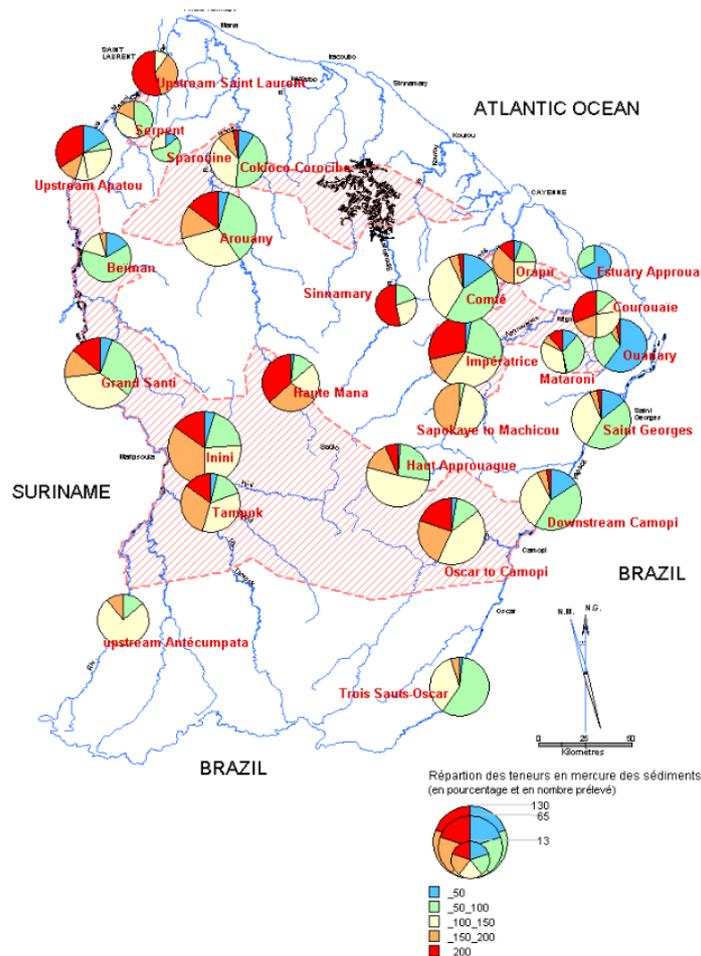
The total mercury content was measured on 1211 raw samples (<500 µm).

The 1211 data are presented in the form of a histogram with 21 classes (each class at a range of 50 ng g⁻¹) in the figure below. 94% of the samples are distributed in the first 5 classes (0 < 50 ng g⁻¹; 8.3%, 50 to <100 ng g⁻¹; 28.7%, 100 to <150 ng g⁻¹; 33.0%, 150 to <200 ng g⁻¹; 16, 3%, 200 to <250 ng g⁻¹: 7.4%), 70% of which has a mercury content below the maximum level of the estimated local geochemical background (Laperche et al., 2007). Only three samples (0.25% of all samples) have a mercury content greater than 1000 ng g⁻¹.



Percentage distribution of Hg levels in sediments (<500 μm) over the whole of French Guiana

The data set was also represented as a map (see below) and shows the good correlation between areas with high mercury concentrations (> 150 ng g⁻¹) and areas potentially affected by gold extraction (shaded areas in red).



Distribution of Mercury Levels in Sediments (%) (In red the names of the areas where the sediments were collected and hatched: the areas potentially affected by gold mining).

Surface water background

The quantities of mercury present in the water are very low (well below the drinking water standard of 1 µg/l) and pose no risk in the case of direct consumption or bathing. In addition, 99% of the mercury present in water is in inorganic form (Boudou et al., 2006), a form that is not very bioavailable for aquatic organisms.

Boudou A. Dominique Y. Cordier S. et Frery N. (2006) Les chercheurs d'or et la pollution par le mercure en Guyane française : conséquences environnementales et sanitaires. Environnement, Risques & Santé 5 : 167-179.

Grimaldi M., Gaudet J.P., Grimaldi C., Melieres M.A., Spadini L. (2001) Sources, stocks et transfert dans les sols et sédiments, Programme mercure en Guyane, Rapport Final, 1ère partie, 4-35.

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Laperche V., R. Maury-Brachet, F. Blanchard, Y. Dominique, G. Durriue, J.-C. Massabuan, H. Bouillard, B. Joseph, P. Laporte, N. Mesmer-Dudons, V. Duflo et L. Callier (2007) ? Répartition régionale du mercure dans les sédiments et les poissons de six fleuves de Guyane. Rapport BRGM/RP-55965-FR. <http://infoterre.brgm.fr/rapports/RP-55965-FR.pdf>