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MERCURY ACCUMULATION IN NATURAL FORESTED AMAZONIAN SOILS

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Total mercury concentrations were determined in soils from a forested and a neighboring deforested area of the Serra do Navio region (Amapá State – Brazil). Samples were collected in the surface and in different horizons of ferralitic soil profiles.

In the forested area, Hg concentrations in the 0-10cm samples ranged from 431 to 141 $ng.g^{-1}$ (d.w.) following a downhill gradient. On the top of the slope, the cumulative Hg burdens in 0-20 and 0-70 cm layers were 73.200 and 272.880 $\mu g.m^{-2}$, respectively. Downhill, the cumulative burdens in the 0-20 and 0-70 layers decreased to less than one half. Considering soil profiles, Hg concentrations decreased with depth to less than 100 $ng.g^{-1}$. The highest Hg contents, up to 850 $ng.g^{-1}$ were found in the ferruginous nodules from concretionary horizons and were associated with the highest Fe contents. In these horizons, Hg concentrations, as well as Fe concentrations, were always higher in the nodules than in the matrix. On the other hand, organic carbon was always found in low concentrations (total carbon < 4%), showing no correlation with Hg. Thus, in this type of soils, Hg accumulation seems to be associated with Fe rather than with organic matter, in contrast with temperate and nordic soils.

In the deforested area, Hg ranged from 57 to 103 $ng.g^{-1}$ in the 0-10 cm layer. The Hg cumulative burden (0-10 cm) was about 7.700 $\mu g.m^{-2}$.

The accumulation of Hg was consistently stronger in the upper horizons of the soil profiles than in the deeper zones. However, it is not clear whether this is due to natural redistribution of Hg within the profile or to long-range atmospheric transport which in this region could be enriched by Hg proceeding from gold mining. In any case, the ferralitic soils, rich in ferruginous nodules, which are efficient traps for Hg, are important reservoirs for this element. The natural pedogenetic evolution of these soils on downhill, under hydromorphic conditions, leads to the reduction of Fe oxy-hydroxides, releasing Hg in the aquatic systems. This evolution can be significantly enhanced by deforestation. On deforested slopes, intense mechanical erosion removes the fine soil fraction richer in Fe and Hg, also leading to lower Hg burdens.

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