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Atmospheric deposition of mercury in Atlantic Forest and ecological risk to soil fauna

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The increasing levels of mercury (Hg) found in the atmosphere nowadays has a great contribution from anthropogenic sources and has been a great concern in the past two decades in industrialized countries. Brazil is the seventh country with the highest rate of mercury in the atmosphere. Certainly, the petroleum refineries have significant contribution, seen that 100 million m3 of crude oil are annually processed. These refineries contribute with low generation of solid waste; however, a large fraction of Hg can be emitted to the atmosphere. There are sixteen refineries in Brazil, three of them located in the state of Rio de Janeiro. The Hg is a toxic and hazardous trace element, naturally found in the earth crust. The major input of Hg to ecosystems is through atmospheric deposition (wet and dry), being transported in the atmosphere over large distances. The forest biomes are of great importance in the atmosphere/soil cycling of elemental Hg through foliar uptake and subsequent transfer to the soil through litterfall, which play an important role as Hg sink. The Atlantic Forest of Brazil is the greater contributor of fauna and flora biodiversity in the world and, according to recent studies, this biome has the highest concentrations of mercury in litter in the world, as well as in China, at Subtropical Forest. Ecotoxicological assessments can predict the potential ecological risk of Hg toxicity in the soil can lead to impact the soil fauna and indirectly other trophic levels of the food chain within one or more ecosystems. This study aims to determine mercury levels that represent risks to diversity and functioning of soil fauna in tropical forest soils. The study is conducted in two forest areas inserted into conservation units of Rio de Janeiro state. One area is located next to an important petroleum refinery in activity since fifty-two years ago, whereas the other one is located next to other refinery under construction (beginning activities in 2015), which will be the largest refinery of Brazil and, consequently, with less anthropogenic influences for the moment. Ecological risk assessments are conducted together with ecotoxicological tests in natural and artificial tropical soils, using exotic and native species of the soil fauna, naturally present in the area of study, in order to determine the risk of mercury in soil and litter in tropical forest. Previous results confirm higher concentrations of mercury in litter and soil of the forest area closest to the operating refinery. The presence of Hg seems to select the size of the organisms as well as the abundance and diversity of the soil fauna that remain in tropical forest.