

SUITMA 10

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Soils of Urban, Industrial, Traffic, Mining and Military Areas

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Abstract No.	A-013
Abstract Title	Polycyclic Aromatic Hydrocarbons (PAHs) and Heavy Metals in Permafrost-affected Soils and Lichens from Mining Areas in the Russian Arctic
Abstract	<p>Introduction : The largest chromite mining factory in the world is located in the Yamalo-Nenets Autonomous Okrug, Russian Arctic. Our study is to investigate the composition and distribution of PAHs/metals in soils and lichens in the study areas; to determine the contribution of mining activity by identification of sources; to describe the relationships between the distribution of soil and lichens to the physicochemical properties of PAHs at high latitudes and to evaluate the hazardous possibility of the heavy metal's levels to different local population.</p> <p>Material & Methods : Forty soil and lichen samples and sixteen soil horizon samples were collected in the mining and surrounding areas. The 16 priority PAHs from US EPA and 8 heavy metals (Cd, Zn, Ni, Mn, Cr, and Hg) were measured. PAH concentrations and lichen/soil (L/S) ratios were determined. The assignment of PAH sources was determined by the positive matrix factorization method. Geoaccumulation index and pollution load index for metals were evaluated and potential health risk of each heavy metal is determined as the hazard quotient (HQ).</p> <p>Results : The 5+6-ring PAHs were most abundant in the mining area. The L/S results show that 5+6-ring PAHs could be transported by air and thus occur more in lichens than in the soil, while 1+2-ring PAHs accumulated more in the soil. Strong relationships between the quotient of soil/lichen L/S and Log PL and between the quotient of lichen/historic horizon soil and KOW were observed. Hydrogeological conditions influenced the downward transport of PAHs. Also, the surprisingly high levels of 5+6 rings were found in the permafrost table. The results showed that Hg was extremely polluted in all sites, Cd and Ni are only moderately polluted in mining areas. HQ values indicated a health risk for adults for heavy metals, while Ni, Mg, Hg may cause potential health risk for children via soil ingestion.</p> <p>Conclusions : Mining activity was the major source of PAHs/metals in the area, and that influenced the surrounding natural area. Our study shows that intensive mining activities in the Russian Arctic may threaten the fragile tundra ecosystem in this region.</p>
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