

Soil geochemistry of the Tiksi area, Northern Yakutia, Russia

Iuliia Antcibor, Annette Eschenbach, Sebastian Zubrzycki, and Eva-Maria Pfeiffer
University of Hamburg, Hamburg, Germany (julia.antsibor@uni-hamburg.de)

Northeastern Siberia represents an area remote from evident anthropogenic trace metal sources. However, a risk of airborne pollution by trace metals from anthropogenic sources connected to the settlements exists. Tiksi ($71^{\circ} 42' 55.6''$ N, $128^{\circ} 48' 46.3''$ E) is one of the largest settlements in the Siberian north. It is located between the Lena River and the Kharaulach River mouths. The objective of this study was to investigate features of the spatial element distribution in representative landscape-geochemical units of the Tiksi area and to identify whether local pollution from the settlement takes place. The physical and chemical properties of soils were accessed at three sites located radially in the immediate vicinity to the town Tiksi and one control site remote 10 km south from the settlement. The surface soil horizons were generally enriched by organic matter. Surface soils of the remote site were characterized by the lowest carbon content. The elements measured were As, Cd, Co, Cu, Fe, Mn, Ni, Pb, and Zn in soils through atomic absorption spectrometry (AAS). Differences in the element content were found for various relief forms (depressions, slopes, and elevations). The coefficient of soil buffer capacity (Bf) for the surface soil horizons in depressions was the highest ($Bf > 40\%$) for the majority of elements indicating their intensive accumulation there. In the surface soil horizons of elevated landscape forms the coefficient, by contrast showed low to very low soil buffer capacity to accumulate metals ($0\% < Bf < 20\%$). The hill slopes of the study area were characterized by moderate to high Bf (20 - 40 %) for As, Cd, Co, Cu, and Mn, low to moderate Bf (10 - 30 %) for Zn, and very low Bf ($< 10\%$) for elements Fe, Pb, and Ni. No significant difference in metal distribution among studied sites, except for the western site which was characterized by the highest median Ni concentration was found. The data suggest that ecological impacts at the studied sites were low except for one site north to Tiksi where signs of local pollution probably as a result of local emissions of fuel and mining operations were detected.