SUITMA 11
11 th Conference on Soils of Urban, Industrial, Traffic and Mining Areas
Soils and the food, water, energy nexus
05.09.– 09.09 2022 Berlin, Germany

The impact of railway exploitation on urban soils

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Abstract (max. 400 words)

Since the invention of the railroad, the network of tracks covers and influences more and more areas. In XIXth and XXth centuries the railway tracks were typical elements of urban areas. As the main way to deliver bulk materials and goods, they were brought to each individual industrial plant. Additionally, they have been a very important element of passenger transportation system. Tracks has been made both on construction embankments and directly on the soil surface. The movement of heavy trains causes damage of the soil structure as many changes in the physical properties of soil as well, only partially reduced by the structure of the track. As a result of the contact of the wheels with the track, friction is created, the effect of which is the systematic release from alloy and unalloyed steel elements of metals into the soil environment. In addition, many substances leaked from the wagons to soil during normal operation, and on a massive scale during railway failures and disasters.

In order to show the influence of railway tracks, field and laboratory tests of soil from the track area were carried out in the city of Zielona Góra (western Poland). The research was carried out in railway areas operated at different times, reflecting both the situation within and away from the track.

The influence of railway line construction processes, its operation and mutual relations to the use of adjacent areas was demonstrated. A number of similarities between the soils as well as differences related mainly to the structure of their soil profiles under the track and presence of artefacts were found. The analyzes showed an increased concentration of heavy metals and raised pH and EC values within and in the vicinity of the track, but not to the extent that could be described as a specific feature of this individual form of use. The construction of the soil profiles showed a number of characteristics specific for the studied form of land use, including material compaction of the subsurface horizons, the share of the soil skeleton greater in the upper parts of the soil profile than in the deeper ones. Others characteristics were typical for the majority of urban soils, especially chemical properties – Ca, $CaCO_3$, Na, K, Fe, Mn, Al content.