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BOOK OF ABSTRACTS

Complex mineralogical study of metal sorption onto soil mineral phases

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Soil mineral phases play a significant role in controlling trace metals mobility in soils through sorption processes. We combined batch cadmium, copper, lead and zinc sorption experiments on six soil samples with contrasting characteristics in their pH, TOC, CEC and clay content/mineralogy with the mineralogical analyses of the solid phase by transmission electron microscopy, X-ray diffractometry and infrared spectroscopy. Metals' selection was carried out on the basis of their environmental and agricultural importance. Our aim was to study the metal sorption capacity of soil mineral phases and to evaluate the effect of presence of mineral phases affecting the sorption capacity of soil particles.

Copper and lead were characterized by higher and stronger sorption when compared to cadmium and zinc. Only the former two metals showed significant differences in their sorbed metal amounts on the studied samples and soil mineral particles due to the competitive situation.

Cadmium, copper and zinc sorbed mostly on soil mineral constituents, whereas lead was preferentially associated to organic matter. Additionally, the competitive situation resulted in increase of the role of iron oxide phases in lead sorption. Among soil mineral phases, highest metal amounts were immobilized on the swelling clay mineral particles, but iron oxides may also have similarly high sorption capacity for lead. The close association of iron oxides and clay minerals (probably in form of coatings) resulted in significant change in their sorption capacities for all the studied metals. Alkaline conditions due to the carbonate content resulted in both increased role of precipitation for lead and copper and in an elevated sorption capacity for the latter by discrete mineral particles that were not found for cadmium, lead and zinc.

Using such kind of complex mineralogical analysis of the soil, the sorption characteristics of metals onto soil mineral phases could be supported by more detailed data. When the methods used in this study are combined, they become an extremely powerful means of obtaining a more complete insight into soil-metal interaction.

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