Geophysical Research Abstracts,
Vol. 11, EGU2009-300, 2009
EGU General Assembly 2009

Transformation of the soil clays under the anthropogenic salinization

Y. Simakova
(yssimakova@geo.komisc.ru)

The objects of our investigation are the podzolic soils from the Seriogovo salt plug territory (Russian platform) where salt mineral waters deposites are situated.
Samples were obtained from 7 soil uncontaminated (background) and saline cross sections near the Seryogovo salt deposite at the depth 0-103 cm.
X-ray analysis indicates that almost all clay samples of background sections contain smectite, illite, chlorite, kaolinite with dominated smectite. In clay samples of saline soils chlorite, vermiculite, interstratified chlorite/vermiculite, kaolinite, illite and galite are contained. Chlorite became the predominant 1.4-nm-mineral.
Smectite is the most abundant mineral in the clay fraction of uncontaminated soils. The smectite is not well ordered, evident by incomplete collapse to 1.0 nm when heated to 550oC. Small amount of disordered chlorite contains in this samples. In the lower parts of saline cross sections smectite is almost disappeared, the most abundant minerals are pedogenic dioctahedral chlorite and interstratified minerals.
The comparison of the ”d(060)” value of XRD patterns display that uncontaminated and contaminated samples has both trioctahedral and dioctahedral minerals but the intensity of the 060 peak for the dioctahedral mineral of saline soils, however, is proportionally larger than in the uncontaminated clay.
The investigations display the difference between the clay minerals of saline and background soil samples of Seriogovo deposits because of their transformation under the environmental changes. The expandable layer silicates typical for the soils transformed to the unexpandable dioctahedral soil chlorite. Transformation reactions involves the introduction of non-exchangable hydroxyl-Al polymers into the interlamellar space of pre-existing smectite or vermiculite. We can propose that interlayer octahedral layers are more stable than exchangeable cations of clay minerals’ crystal structure in the saline environment.
The results presented suggest that chlorite was formed diagenetically by prolonged periodic percolation of salt brines through previous layer silicates.