



Modeling of salt-water migration through spod-podzolic soils under the field and laboratory conditions

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The assessment of highly mineralized water influence on soils is an important issue in the contemporary world. Various regions with different conditions are exposed to salt-affected soils forming. Salinization of soils is a complex process of the chemical and physical properties changes. Therefore the chain of the laboratory and field experiments should be done in order to assess the main factors promoting highly mineralized water migration. In addition to it modelling is a good way to understand and evaluate main chemical and physical transformations in soils.

The chain of experiments was done to assess salt water movement in spod-podzolic soils under field and laboratory conditions. The main goals were to evaluate the rate of salt water movement through soils and to estimate velocity of the desalinization process.

Field experiment was conducted on spod-podzolic soils of Kaliningrad region. There were 4 sites measuring 20*25 cm watering with salt water in amount of 5 liters per each area. The mineralization of the solution was 100 g/l. In addition to the salt affected sites, 2 non polluted grounds were assessed too. Soils samples were collected in the period of 1 week, 1 month, 3 month and 1 year after the spill had been done. The samples were taken each 10 cm 110 cm deep and in double repeatability. Main chemical and physical parameters, such as volume water content, pH, conductivity, amount of calcium ion, magnesium, sodium, and chlorite in soils etc. were measured in each sample.

The second experiment was conducted to evaluate the rate of soils solutions transformation under the laboratory conditions. Organic horizon was taken from the field and was stuffed in columns with 1.0 g/cm³ density. There were 16 columns with 4 cm diameter. 14 columns were showered with salt water with the same mineralization as in the field experiment. The amount of salt water injected in columns was 104 mm per one sample which is equal to the salt water volume spilled per one area in the previous experiment. Also there were 2 columns as a verification variant contained pure soil. Each column was washed off with different amount of distilled water. The total volume of the pure solution was equal to the mean amount of the annual precipitation in the region of the field experiment. The main physical and chemical properties were measured in soils samples as well in the first experiment. In addition to it the complex assessment of soil's water were made.

The experiments revealed the fast rate of salinization-desalinization processes in spod-podzolic soils of the coniferous areas in Kaliningrad region. The maximum values of conductivity were observed at the end of 1 week period and made up more than 2000 mSm/cm in top soils horizons. Furthermore the desalinization of the soils took place in both field and laboratory experiments a year after the spill.

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