



Agro-geochemical problems in the soil-parent rock-groundwater system

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Our agrogeological methodological research takes place on small areas (from hundreds of m²-s to 20-50 km²), so called model areas, chosen by different (geological, soil scientific, agricultural, environment protectional etc.) considerations. These relatively small areas, are explored with densely drilled (50-500 m borehole distance), maximum 10 meters deep shallow boreholes to explore agrogeological problems in detail.

At the beginning of the 1980's we worked out the "BFK" method for the agrogeological research of the model areas. The essence of this method is that, besides the usual geological sampling, samples are taken from these densely drilled bores, from the upper and lower part of the soil, from the intact parent rock of the soil, from the groundwater fluctuation zone, from the water saturated zone and from the groundwater. Detailed examinations are made on these samples to establish agrogeological principles from the results.

With this method we can examine not only the soil in a narrower sense but the entire upper 10 meter thick section of the near-surface loose sediments with the moving groundwater in it. Among other things this method is excellently suitable for the examination of different geochemical problems.

The near-surface behavior of the metallic nutrient-microelements determined by, not only the oxidation-reduction potential and pH-conditions, but the possibility of the

complex formation and cation absorption, and these are determined by the grain size distribution and the organic material content of the soil. In fine grained sediments above the groundwater table capillary water mainly fills the pores and the infiltrating precipitation wash the changing valence elements to the deeper zones in reduced form. In coarse grained sediments we can find also ground air in the pores (three phase zone) in these conditions Fe and Mn precipitating in oxi-hydroxide form. The Mo, Cr and Co enter to these colloids, the As and other submetallic elements (Sb, Bi) tie on the surface of them. The two valenced cations (Cu, Zn, Pb, Ni etc.) forms organic complexes in the soil's humous "A" level. In the deeper zones these organic colloids disintegrate and – if the sediment is rather fine grained – absorb on the clay fraction of the sediment.

So above the table of the permanently water saturated zone (so called "green line") the geochemical character of the loose sediments depend on the grain size distribution of them, but below this "green line" the uniformly reducing conditions eliminates the lithological differences.

All these processes basically depend on the geographical-meteorological conditions, and on the amount of water reach the soil surface. On flood-plains of the rivers the soil pores nearly always remains water saturated and this oxidative zonality will not developed, but on extreme arid climate oxidized metallic hydroxides can precipitate in fine grained sediments too.