



Initial soil formation and humus accumulation on the spoil heaps of sandy quarry, Russian-North-West

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The accumulation and transformation of organic matter were studied in chronoseries of different aged (3-, 10-, 20-, 30-, 43-, and 60-year-old) soils and a reference (mature) plot. The ecogenetic succession of plants on sand quarry dumps was started from grass plant community and finished on the Scotch Pine forest on the 60-years old plot. The pedogenesis rate was closely related to the rate of phytocenosis development, and the thicknesses of organic and mineral horizons increased synchronously. The profile distribution of organic matter in young soils was estimated as an ectomorphic distribution, and the humus stocks in the mineral horizons of the same soils were comparable with the reserves of organic matter in the litters. The illuvial (Bs) horizons of the soils under study played a significant role in the accumulation of organic carbon; the resistance of organic matter to mineralization increased with age. In the soil chronoseries, the caloricity of litter organic matter increased, as well as the content of energy accumulated in the litters. The composition of humus differed strongly between the eluvial and illuvial horizons; in the chronosequence, the relative content of humic acids increased in the E horizon, and that of fulvic acids increased in the B horizon. On the base of C-13 NMR study of humic substances the humic and fulvic acid are different in organic, eluvial and illuvial horizons in terms of different structural components content. The effect of the phytocenosis on the soil was increasingly mediated with time. The accumulation and transformation of organic matter were the leading pedogenic processes at all stages. The main conclusion of investigation is that the 60 years is enough for formation of embryo-profile of podzol soil on the dumps of quaternary sands of former sandy quarry in the south taiga, North-West of Russia.