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Biogeochemistry of carbon and related major and trace elements in peat bog soils of the middle taiga of Western Siberia (Russia).

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Global climate changes impact the status of wetland ecosystems shifting the balances of the carbon, macro-, and microelements cycles. This study aims to establish the features of accumulation and distribution of major- and trace elements in the organic layer of peat bog soils, belonging to different ecosystems of the oligotrophic bog complex located in the middle taiga of Western Siberia (Khanty-Mansiysk region, Russia). Key areas which are selected for this study include the following bog conjugate elementary ecosystems: higher ryam, lower ryam, ridge-hollow complex, and oligotrophic poor fen as characterized previously [1].

We have sampled various peat types along the entire length of the soil column (every 10 cm down to 3 m). Peat samples were analyzed for a wide range of macro- and microelements using an ICP–MS technique following full acid digestion in a microwave oven. These measurements allowed quantitative estimates of major- and trace elements in the peat deposits within the whole bog complex and individual elementary landscapes. Based on the data obtained, the lateral and radial geochemical structures of the bog landscapes were determined and clarified for the first time for middle taiga of the West Siberian plain. The similar regime of mineral nutrition during the complete bog landscape formation was detected for the peat deposits based on the measurements of some major- and trace elements (Ca, Fe, Mg, etc.). The vertical distribution of some major and some trace elements along the profile of peat column is rather uniform with relatively strong increase in the bottom organic layers. This strongly suggests the similarity of the processes of element accumulation in the peat and relatively weak post depositional redistribution of elements within the peat soil profile. Overall, obtained corroborate the existing view on chemical composition of peats being determined by botanical peat's components (which forms this peat deposit), atmospheric precipitation, position of ecosystems in the landscape (lateral migration) and types of bedrocks [2].

The results allow better understanding of the coupling between biogeochemical cycles of carbon and major and trace elements in peat soils in order to predict the future changes in both concentrations and stocks of chemical elements in the Western Siberia peat bog systems under climate warming.

References

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