Geophysical Research Abstracts
Vol. 17, EGU2015-1028, 2015
EGU General Assembly 2015
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Fire effects on peat and organo-mineral soils of Meshchera plain

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The fire effects the soil properties depend on soil type and on their vulnerability to fires. The most of available data is devoted to changes in organo-mineral soils. But the peat fires can cause deeper changes in soil profiles, especially in case of drained peat soils. Now the lack of information exists in the sphere of the comparison of these fire types on soil cover. Meshchera plain (Moscow and Ryazan Regions, Russia) has different soil types. Moreover peatlands were partly drained, and the plain was affected by numerous fires of different time. So there is a need of detailed post-fire soil investigations in this region.

During current research the soils Meshchera plain subjected by wildfires of 2002, 2007, 2010 and 2012 were studied. A total of 32 profiles including background and post-fire histosols, histic and sod podzols were investigated. Moreover the detailed description of vegetation cover was conducted. The samples were taken from genetic horizons. The morfological properties of soil profiles were sudied and the samples were analysed on organic carbon, pH, macroelements, magnetic susceptibility.

After the wildfires changes in morfological and physico-chemical properties of soils were detected in most cases. The formation of ash and charry horizons was observed only in cases of peat soils affecetd by intense fires, and all post-fire drained peat soils had thick ash horizons even after 10 years after the fires.

The significant loss of organic matter took place after burning. But almost immediately after the fires new stage of humus formation usually started. For instance, in post-fire histosols in 2 years after the burning the content of organic carbon reached to 10-12 % in upper horizons.

ph values in background histosols were approximately 4-5. After the fire pH increased in these soil type to 8, and two years after the fire event pH decreased to 6-7. In podzols pH values returned to the pre-fire level 4-5 in two years.

The magnetic susceptibility of soil samples in background histosols was 2-40 $\times$10–6 cm3/g. After the fires it increased in ash horizons up to 250 $\times$10–6 cm3/g. In sod podzols the changes also occurred. Background podzols had 2- 5$\times$10–6 cm3/g. Post-fire horizons had up to 50- 60$\times$10–6 cm3/g after the fires. And even 10 years later the differences between post-fire and background soils preserved. So this parameter could be used as an indicator of fire events in soil profiles.

After the fire the significant changes occurred in horizon mineral composition. Ash horizons had elevated concentrations of $Al2O_3$ (9-17%), $Fe2O_3$ (4-11%), $P2O_3$ (1-1,8 %), CaO (1,9-2,8 %) and K2O (0,1-1,9%). The observed trends were similar for histosols and for histic podzols. And the changes in horizon mineral composition remained 2 and 10 years after the fire.

So the more significant morphological and chemical changes occurred in the profiles of histosols, especially fire altered the soils of drained peatlands. These soil type keeps changes even 10 years after the fires.