Geophysical Research Abstracts
Vol. 17, EGU2015-14697, 2015
EGU General Assembly 2015
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Land agroecological quality assessment in conditions of high spatial soil cover variability at the Pereslavskoye Opolye.

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The essential spatial variability is mutual feature for most natural and man-changed soils at the Central region of European territory of Russia. The original spatial heterogeneity of forest soils has been further complicated by a specific land-use history and human impacts. For demand-driven land-use planning and decision making the quantitative analysis and agroecological interpretation of representative soil cover spatial variability is an important and challenging task that receives increasing attention from private companies, governmental and environmental bodies.

Pereslavskoye Opolye is traditionally actively used in agriculture due to dominated high-quality cultivated soddy-podzoluvisols which are relatively reached in organic matter (especially for conditions of the North part at the European territory of Russia). However, the soil cover patterns are often very complicated even within the field that significantly influences on crop yield variability and have to be considered in farming system development and land agroecological quality evaluation.

The detailed investigations of soil regimes and mapping of the winter rye yield have been carried in conditions of two representative fields with slopes sharply contrasted both in aspects and degrees. Rye biological productivity and weed infestation have been measured in elementary plots of 0.25 m2 with the following analysis the quality of the yield. In the same plot soil temperature and moisture have been measured by portable devices. Soil sampling was provided from three upper layers by drilling.

The results of ray yield detailed mapping shown high differences both in average values and within-field variability on different slopes. In case of low-gradient slope (field 1) there is variability of ray yield from 39.4 to 44.8 dt/ha. In case of expressed slope (field 2) the same species of winter rye grown with the same technology has essentially lower yield and within-field variability from 20 to 29.6 dt/ha. The variability in crop yield between two fields is determined by their differences in mesorelief, A-horizon average thickness and slightly changes in soil temperature. The within-field crop yield variability is determined by microrelief and connected differences in soil moisture. Higher soil cover variability reflects in higher variability of winter ray yield and its quality that could be predicted and planed in conditions of concrete field and year according to principal limiting factors evaluation.