



Double Harmonization of Transcontinental Allometric Model of *Picea* spp.

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Abstract: For the first time the trans-Eurasian additive allometric mixed-effects model of tree biomass components (stems, branches, needles and roots) is designed using the database unique in terms of its volume in a number of 900 model trees of five species of *Picea* spp. taken on sample plots within species from natural habitats in Eurasia. The problem of double harmonization of the model was first solved, in the structure of that two approaches are combined, both in ensuring the principle of additivity of biomass components and in involving into the model the block of dummy variables localizing it along eco-regions of Eurasia. Trivial model involving the dummy and numeric (stem diameter at breast height and the tree height) variables in allometric equations without additivity components gives biomass estimates harmonized according to eco-regions but differing by the absolute value of the mass components only. The fundamental distinction and advantage of the developed model of double harmonization is that unlike of trivial mixed-effects model, it provides compatibility and difference by eco-regions not only of absolute values of biomass components, but also of their ratios, i.e. reflects regional traits of biomass component structure.

Keywords: Biosphere role of forests, Biomass component additivity, Mixed-effects model
