

## ***Interactive comment on “Simulation of tree ring-widths with a model for primary production, carbon allocation and growth” by G. Li et al.***

**Anonymous Referee #2**

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The manuscript describes the use of a light-use efficiency model (P model) in combination with an annual tree growth model. This combination is used to simulate individual tree growth and compare this with tree ring data which were elaborated for a selection of 46 *Pinus koraiensis* trees. This combination of a (stand) growth model with an individual tree model (T-model) and individual tree ring data is a promising approach and meets the needs for ongoing research. The manuscript meets the needs for research in this field. The models itself are described in a sufficient manner. Nevertheless, some details could be described in more detail, the paper needs for a clear distinction of stand and tree growth. Some points for possible improvement shall be mentioned explicitly:

a) Whereas the model descriptions conclude meaningful interpretation of single equa-

C3939

tions and parameters, the parameterization needs for more detailed description.

b) The step from a stand growth model to a tree basis needs for a reflection on competition for nutrients, water, and space besides the already mentioned PAR. Mentioning only “foliage cover” in the first sentence of 2.1.2 is not sufficient here.

c) The inter-correlation among variables (line 244) determining the growth of trees should be reflected more in detail when the co-acting of multiple factors is discussed; the situation should not be described as “confusing” but as “complex”. Accordingly, a more detailed description of the ontogeny and underlying processes is necessary. The development of trees is based on a development of stands with competition effects being probably affected e.g. by forest management (only mentioned e.g. at end of 3.3 or in lines 338/339). Respective description of forests’ and trees’ history in terms of e.g. regeneration, stand density, or thinning regimes is missing in the actual version.

d) Single tree growth may increase with individual tree size (line 346), but this does not necessarily mean that stands of (a low number of) large trees produce as much biomass as young stands do which are built of (a high number of) smaller trees. Tree and stand growth have to be clearly distinguished and, in general, there is no contradiction between decreasing stand growth rates and increasing tree growth rates with age or individual tree size (⇒ e.g. delete “Although” in line 42).

e) The differences among the cohorts are not described and explained in terms of any variable but age before the size of trees is used in the discussion (line 335). What led to the fact that old trees are smaller than the observed mature trees? The growth conditions mentioned in line 336 have to be described; possible impacts of plant origin (genetic aspects) or site quality are not mentioned. Clearly state, if this is due to missing availability of respective information. In addition the variation within the cohorts concerning growth, diameter or any other variable is not described although potentially of interest; a negative correlation to age is visible e.g. in figure 5.

f) The selection of the 46 trees for core analyses is not described. How do the selected

C3940

trees represent the trees in the area and in the cohorts? Is any information available on their ontogeny (natural regeneration/planting, thinning regime, mortality ...)? The general impact of aging (line 250) is not the only driving force which could lead to a reduction of growth; decreasing ring widths are not necessarily an indication for reduced growth or biomass production (on tree as well as on stand level).

g) Tuning of parameters based on the data which are also used for the model evaluation is always a tricky thing. The explorative character of the study, hence, should be pronounced.

Technical corrections:

Line 100: "represnetd" > "represented"

Line 103: ".." > "."

Line 183: "rowots" > "roots"

Line 386: "goodrepresentation" > "good representation"

Go on!

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Interactive comment on Biogeosciences Discuss., 11, 10451, 2014.