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Interactive comment on "The relative contributions of forest growth and areal expansion to forest biomass carbon sinks in China" *by* P. Li et al.

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First, the biomass expansion factor (BEF) doesn't seem to account for differences in wood density, or, at least, the authors don't mention their assumptions concerning wood density. Was one value used throughout? Is it possible that planted forests have a different wood density than natural forests, or that there have been changes through time?

Reply: Thanks for your insightful comments. First, the BEF, is defined as the ratio of stand biomass to timber volume (Mg m-3), and is used to convert timber volume from forest inventory to biomass. The parameter of wood density was not taken into account.

However, previous studies have suggested that BEF is not constant, but varies with forest age, site class, stand density, and site quality (e.g., Brown et al., 1999). Fang et al. (2005), Fang and Wang (2001) derived a simple reciprocal equation from direct field measurements to express the BEF-timber volume relationship by forest type in China and Japan. This simple mathematic relationship fits for almost all forest types. With this simple BEF approach, one can easily calculate regional or national forest biomass based on direct field measurements and forest inventory data. In this study, we used the BEF method with parameters for each forest type from Guo et al. (2010). Second, the R2 values of the BEF equations used to convert timber volume to biomass for most dominant tree species or forest types 0.8 (Fang et al., 2014a). Therefore, the data and method used in the present study show relatively high precision. Previous studies have reported that the estimation error of biomass stocks at the national level are expected to be less than 3% in China.

Second, the results would be better integrated and more compelling if there were a summary Figure that went beyond relative. The authors should consider a summary Figure (Fig. 5) that shows total biomass (PgC) (all forests) through time. Fig. 5a might break the total into natural and planted forests, and Fig. 5b might break the total into those resulting from growth in biomass density and those resulting from changes in areal extent. Such a Fig. would show the relative sizes of these different components to the 30-year gain in biomass. It would make the paper appeal to a wider audience. Reply: Thanks for your nice comments. Following you suggestion, we would add a Fig.5 in revised MS as below which demonstrating the carbon gain resulting from growth in biomass density and areal expansion respectively.

Interactive comment on Biogeosciences Discuss., 12, 9587, 2015.

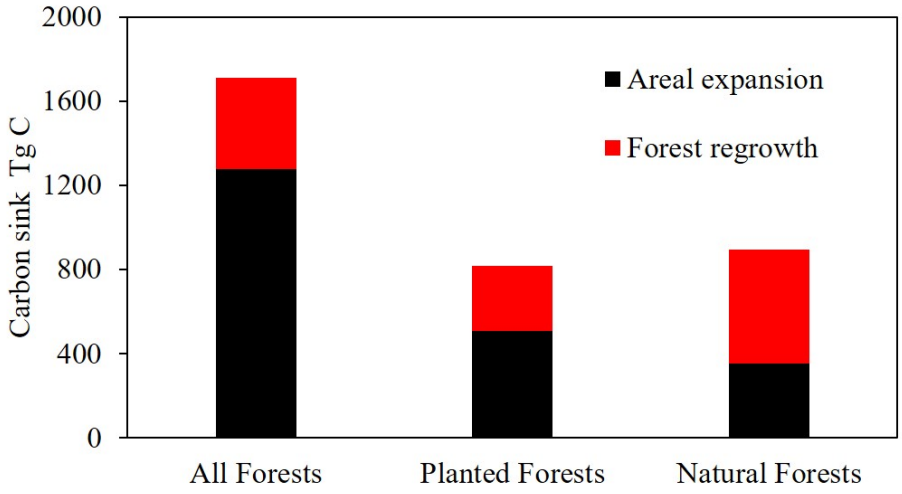
2000
1600
1200
800
400
0
Carbon sink Tg C
Areal expansion
Forest regrowth
All Forests
Planted Forests
Natural Forests

Fig. 1.