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Interactive comment on "Influence of wood density in tree-ring based annual productivity assessments and its errors in Norway spruce" *by* O. Bouriaud et al.

Anonymous Referee #2

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Review:

The manuscript deals with annual variations in wood density of Norway spruce and their implications on upscaling tree-ring width to biomass increment via allometric functions and the potential error sources and magnitudes on tree and plot levels using varying volume and density scenarios. The highly replicated dataset comprises a well-balanced array of tree sizes and ages, and seems very robust.

The main message of the paper is that an increase in WD buffers to a certain extent the decrease in volume increment during bad years. Assuming constant density, this overestimation of reduction in biomass increment appears to be around 15%, at least

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for spruce and the present dataset, where the negative relationship between WD and TRW is strong. Although uncertainties on tree level are quite high, it seems comforting that they cancel each other out, due to the normally distributed behavior of the uncertainties, when going to the plot level, a measure, which will be used in the end to estimate the actual inter-annual variability in carbon uptake.

The paper is well written and comprehensible and makes a valuable contribution to the present research questions concerning annual variability in aboveground carbon uptake by forest ecosystems.

Specific comment:

Page 5883 lines 4-6: The rate of -0.48 kg m-3 mm-1 should be -48 kg I guess, since you have 1/100 mm on the x-axis in the plot and probably haven't considered the transformation to 1 mm. Hence it seems wrong to me that WD halves when RW is doubling, the negative exponential shape of the points is not that steep! Just take for example the average WD at 1mm, 2mm, 4 and 8mm, which are probably something in the region of ∼550, 450, 380 and 320 kg m-3. The ratios are much closer to 1/0.85. So I would assume it to be more like a 15% decrease/increase WD per doubling/halving RW, which in turn would resemble your result for the underestimation of biomass in bad years.

Other minor comments:

Page 5876 line 21: "seven samples" instead of "seven sample"

Page 5878 lines 9/10: "proportionality OF (THE) bark thickness"

In table 1, equation for model 3: shouldn't it be a4 at the end instead of 0.5?

Figure 3b: Could you insert vertical lines throughout the graph at the years mentioned (1967, 1976, . . .) ? That would improve in my opinion the comprehensibleness.

Figure 6 should include a legend, or at least a more detailed description. It is not

obvious what the dashed lines mean, is it Scenario 3?

Interactive comment on Biogeosciences Discuss., 12, 5871, 2015.

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