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Interactive comment on "Impact of nitrogen fertilization on carbon and water fluxes in a chronosequence of three Douglas-fir stands in the Pacific Northwest" *by* X. Dou et al.

Anonymous Referee #3

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Here a short review Dou et al. focussing on the ANN method. The ms investigates the effect of nitrogen fertilisation by training an artificial neural network (ANN) on non-fertilised flux data of the years 1998-2004, validating it with data from 2005 and 2006, and comparing the fluxes after fertilisation with the ANN predicted fluxes.

In principle, the ANNs are very useful as benchmark for explaining past trends as demonstrated for example in Keenan et al. (2012) GCB. However, there is a key difference between the two manuscripts: Keenan at al. used the original half-hourly time step whereas this ms uses monthly aggregated sums/means. Since the responses of an ecosystem to the meteorological drivers are generally instant, they should thus preferably be investigated at the according time scale. Aggregated scales will only

show aggregated effects and could potentially even smear out any real underlying effects. Hence, an approach with monthly data is very coarse. This is even more crucial, since the ms is lacking any kind of statistical analysis to determine the uncertainty in the flux estimates.

Another important point missing in the statistics is the bias error. The latter explains the offset between predicted and measured. If the ANN has an inherent bias error, this would potentially offset the fertilisation effects. There is also no objective criteria for the choice of the optimal ANN model provided. According to the text, these were chosen by attempts (page 2009, line 24) and being convinced (page 2010, line 9).

That there might be potential problems with this coarse approach can be depicted in figure 5 (i). Despite the good modelling performance in GPP and RE (with high R2 of the ANN of 0.94 and 0.97), their difference NEP shows little correlation (R2 of the ANN 0.45). I therefore recommend to repeat the analysis on a higher time resolution, preferably the original half-hourly time stamp.

Interactive comment on Biogeosciences Discuss., 11, 2001, 2014.