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Interactive comment on "Role of de novo biosynthesis in ecosystem scale monoterpene emissions from a boreal Scots pine forest" *by* R. Taipale et al.

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We thank the referee for the review and the helpful comments.

Response to the major remarks

P8023, L25: Right, the statement was misleading. In our formulation, the hybrid algorithm had only two free parameters: the total emission potential (E_0) and the ratio of the de novo emission potential to the total emission potential (f_{synth}). The original values (Guenther, 1997) were used for the parameters related to the emission activity factors (C_T, C_L, and γ). We chose the simple two-parameter formulation since large uncertainties (95% confidence intervals) made the results useless when more free pa-

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rameters, such as the temperature dependence coefficient for pool emissions (β), were included. We amended the paragraph about the algorithm parameters.

P8024, L25: In general, we improved the statistical analysis by inserting monthly emission–temperature, emission–PAR, and temperature–PAR correlations and by performing a restricted range analysis to determine whether the emissions had a light dependent component. We also added information on the reliability of the determination of f_synth to Sect. 3.2, hoping that it provides a means of evaluating our method. Thus we decided to hold on to the common but vague description "using non-linear regression in the least squares sense" instead of trying to explain the mathematical details of the regression analysis (based on the Matlab functions nlinfit and nlparci).

Correction for night-time observations: True, the ratio of de novo emissions to total emissions should have a clear diurnal cycle. As our analysis was based on ecosystem scale measurements, we could not determine this ratio as directly as in $^{13}CO_2$ labelling experiments (Shao et al., 2001; Ghirardo et al., 2010). Thus we relied on the ratio of the two emission potentials (f_synth). We focused only on seasonal changes as the amount of data prevented the determination of diurnal variations for each month. Therefore also the night-time observations ($C_L = 0$) were included in the regression analysis. Their exclusion would have had only a marginal effect on the values and confidence intervals of f_synth.

Response to the minor comments

P8023, L25: We improved the argumentation for the choice of the hybrid algorithm.

P8025, L7: Right, differences in PAR within the canopy were not taken into account. This unrealistic assumption was necessary as the analysis was based on ecosystem scale measurements.

P8026, L1: We amended this sentence.

P8027, L15: We removed this speculation as Sect. 3.2 discusses the trends in both

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emission potentials in more detail.

P8028, L15: Both reasons suggested by the referee seem sensible. The revised expression is "probably due to changes in the diffusivity of this pathway or in the monoterpene composition".

Interactive comment on Biogeosciences Discuss., 7, 8019, 2010.

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