Comment on gmd-2021-104

Anonymous Referee #1

Referee comment on "FORest Canopy Atmosphere Transfer (FORCAsT) 2.0: model updates and evaluation with observations at a mixed forest site" by Dandan Wei et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-104-RC1, 2021

General comments

This study updated the 1D model FORCAsT from 1.0 to 2.0 by improving the computation efficiency, eddy diffusivity parametrization, dry deposition calculation, as well as the isoprene-related chemistry and aerosol processes. The comparison results with the measurement data showed that the new model performed better especially in simulating, e.g., the vertical profile of isoprene concentration in the early morning, diurnal variation of temperature, the in-canopy concentrations of MVK+MACR and IHN, the ratio of ISOPOOH to MVK+MACR under low-NO condition. This research fits the scope of GMD, and the manuscript is written clearly, so I suggest to publish after minor revision.

Specific comments

P6, L137: So here z_i is an integral value, is it a constant within one day? How do you calculate K_{new} before z_i is calculated every day? Please specify more clearly here how the K_{new} and z_i are calculated in the model.

P7, L152: "where input data are available"

What are the input data for the calculation of dry deposition velocities of the species here?

P7, L158: "lack of data"

What kind of data does it mean?

P7, L159-160: "The estimates of the dry deposition velocity are then scaled by the leaf area distribution in the canopy."

Does the "estimates" mean the estimate for methyl vinyl ketone and methacrolein or all the compounds in Table 2?

Section 3.3: Why the modelled O3 concentration did not show a diurnal pattern as the observation in Fig. 4? Would a spin-up run be helpful to reduce the initial peaks of ROx and NO2?