

## ***Interactive comment on “The Joint UK Land Environment Simulator (JULES), Model description – Part 2: Carbon fluxes and vegetation” by D. B. Clark et al.***

**Anonymous Referee #1**

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General comments: This paper describes modifications to an existing model, which simulates carbon fluxes and pools in vegetation and soil. These modifications include multi-layer representations for vegetation canopy, a sunfleck penetration scheme, representation of the effects of O<sub>3</sub> on photosynthesis, and description of CH<sub>4</sub> emission from wet land. As authors insisted, it is meaningful to consolidate such advanced representations for fundamental processes into a single model so as to be able to study their interactions in a consistent manner. The overall presentation is well structured and clear. It is also well informed in terms of literature on each fundamental processes and parameterization. The mathematical formulas and symbols are appropriately defined and used.

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Technical corrections: Overall: It would be useful to add a table for list of variables including units.

Page 653: Equation (20): Is this equation delivered from the equation (17)? If so, the incident direct radiation 'I<sub>b0</sub>' should be multiplied to the right side.

Page 656: Lines 9: Authors could state shortly underlying mechanism that improved the simulation output.

Page 660: Line 11: A phrase 'respiring root and stem' should be changed to 'root and respiring stem'.

Page 660: Line 16: Please add a citation for the pipe-model.

Page 661: Section 5: I feel section 5 and section 6 should be exchanged. Otherwise, equation (45) in the section 5 is not understandable in the first look.

Page 663: Equation (49): A variable 'f<sub>theta</sub>' should be capitalized as was first presented in the equation (46). In addition, a symbol 'S' is already used as respiring-stem carbon in the equation (39). Authors should use different symbol for soil moisture.

Page 664: Line 3: The phrase "Carbon from decomposition of all 4 carbon pools is partly released to the atmosphere and partly feeds the BIO and HUM pools" should be moved before presenting equations (51) to (54). Otherwise, these equations seem to be very odd at the first look.

Page 664: Line 2: I understand that the variable alpha<sub>dr</sub> is a fraction, which varies from 0.0 to 1.0. If so, why alpha<sub>dr</sub> for crops is more than 1.0?

Page 668: Line 11: The equation (67) cannot be obtained from equations (64) and (39) as is mentioned here.

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