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Interactive comment on "Constraining DALEC v2 using multiple data streams and ecological constraints: analysis and application" *by* Sylvain Delahaies et al.

Sylvain Delahaies et al.

s.b.delahaies@surrey.ac.uk

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We thank referee 2 for his thorough reading of the manuscript and for useful comments. We have addressed all comments and tried our best to clarify the manuscript. Our response is described below. Together with this response we submit a revision of the manuscript which accounts for the changes decsribed here.

The version of DALEC used for this study, referred to as DALECv2 and described in details in Bloom and Williams (2015), is a nonlinear dynamical system, it is not a linear autonomous system. The trajectories of the carbon pools $\mathbf{C}$ are computed using the

recursion formula

$$\mathbf{C}^{t+1} = \mathbf{C}^t + \mathbf{f}(\mathbf{C}^t, \mathbf{p}, \phi(t))\Delta t, \tag{1}$$

where $\mathbf{f}$ is a nonlinear vector valued function of the carbon pools, the parameters $\mathbf{p}$ and the meteorological drivers $\phi(t)$, Δt denoting the step time in month in our case. The nonlinear nature of the model is stressed out in the revised manuscript at lines 77 and 83. Moreover, the definition of $\mathbf{h}$ is clarified at line 197.
The main focus of the paper is on the vector $\mathbf{x} = \log([\mathbf{p}, \mathbf{C}_0])^T$. In section 2.3 first where we investigate the sensitivity of different outputs with respect to $\mathbf{x}$ and its components, and then in subsequent sections where $\mathbf{x}$ is estimated using inverse methods. The vector $\mathbf{x}$, denoting fixed quantities as initial conditions and parameters for the dynamical system DALECv2, is seen as the variable from the point of view of sensitivity analysis and inverse modelling and therefore its components are referred to as state variables, input variables or parameters interchangeably throughout the manuscript. This choice of terminology, stressed out at line 228, have been reinforced in the revised manuscript by adding the present paragraph at line 103.

References

Bloom, A. A. and Williams, M.: Constraining ecosystem carbon dynamics in a data-limited world: integrating ecological "common sense" in a model–data fusion framework, Biogeosciences, 12, 1299–1315, doi:10.5194/bg-12-1299-2015, 2015.

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