

## ***Interactive comment on “Estimation of land-use change using a Bayesian data assimilation approach” by Peter Levy et al.***

### **Anonymous Referee #1**

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This is an interesting paper which tackles an important problem, and does so in an interesting way. I have some issues which I think need addressing, and one suggestion.

1. Notation. I do not like the use of upper-case bold letters for vectors, these are usually reserved for matrices, and I think that, in this paper where both vectors and matrices are used this distinction would help with clarity.
2. Notation (ii). Similarly, I do not like the use of upper case U to indicate a scalar value, usually an upper case letter denotes a random variable.
3. I have some concerns about the use of the Countryside Survey data. There is a reference to a bootstrapping procedure, but this is in an inaccessible internal

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- report which, as far as we can tell, has not been peer-reviewed. What is the bootstrapping seeking to achieve, and how is the stratification which underlies the CS survey accounted for?
4. It is noted later in the paper that ‘an increase in one land use has to be balanced by a decrease in one or more other land uses.’ Given this I am not convinced by the implicit assumption of independence of errors in the likelihood functions where the densities are simply multiplied together over times and land uses (e.g. Equation 5). I would like to see an explicit defence of this assumption.
  5. It would help the author’s case if they could use their modelling framework to explore, independently of their data, the scope for variation in CO<sub>2</sub> fluxes associated with some fixed net land use change when gross land use changes are varying.

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