

Earth Syst. Dynam. Discuss., referee comment RC1  
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## **Comment on esd-2021-38**

Anonymous Referee #1

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Referee comment on "Process-based analysis of terrestrial carbon flux predictability" by István Dunkl et al., Earth Syst. Dynam. Discuss.,  
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Review of: Process-based analysis of terrestrial carbon flux predictability

Dunkl et al.

### Overview:

The paper uses a perfect model approach and three statistical metrics to investigate the predictability of carbon fluxes at an annual time scale. The study finds that the spatial-temporal pattern of carbon flux predictability is governed by complex contributions from ENSO, seasonal limiting factors and non-linear ecosystem responses. The paper is generally well written, scientifically sound, and an important contribution to understanding carbon fluxes. I recommend that the paper be accepted with minor revisions.

### General Comments:

1) The 'perfect model framework' is mentioned in the introduction long before it is explained in the methods section. Adding a paragraph to the introduction to explain what the method is, where it has been used before, and its limitations, would help frame the paper better.

2) In the discussion section a paragraph could be added to explain the practical implications of the results. This is briefly mentioned in the last line of the conclusions but it could be fleshed-out better. As is, the paper does not do a good job of explaining why readers should care about the results.

Specific Comments:

Line 21: Be clearer here about whether you mean the seasonal cycle or annual variation in the 1st derivative of CO<sub>2</sub> concentration.

Line 29: Unclear what "of emission reduction detection in the face of internal variability" means.

Line 39: Change 'here' to 'therein'

Line 68: An abbreviation for standard deviation seems unnecessary. Also was the abbreviation ever introduced?

Line 97: 'verification' is the wrong word to use here.

Figure 3: Rephrase caption to eliminate 'significant'. 'values above the 95% confidence ...' is good enough to convey the meaning with stepping on the land-mine of whether or not statistical significance is a metric that should exist.

Figure 7: Explain the yellow triangle in the figure caption.