

Interactive comment on “Improving vegetation phenological parameterization of a land surface model” by B. Chen and M. Che

Anonymous Referee #1

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Chen and Che compared two types of modeling approaches of vegetation leaf phenology: based on Growing Season Index (GSI) or Growing Degree Day (GDD) in the framework of the Dynamic Land Model (DLM). Using GPP data from FLUXNET sites and near-surface remote sensing data from the PhenoCam network as the benchmark, the authors found that DLM-GSI has generally better performance than DLM-GDD and therefore concluded that using GSI phenology model improved DLM. The study itself doesn't have evident flaws, however there is a large room to improve the presentation quality.

Major points: This manuscript may give the readers an impression that GSI model is better than GDD model. But obviously this is not the truth. The authors optimized the GSI model but remain GDD model as default in CLM. I would expect the performance of the GDD model will be similar as the GSI model after optimization. I suggest the

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authors should add a paragraph of discussion on this point, with explicit statement that the study doesn't suggest GSI model is better than GDD model. Otherwise it is too ambitious since GDD is a big family of models.

The source of FLUXNET data is missing in this paper. The authors must clarify it. However, FLUXNET has already released the 2015 version data (freely available at <http://fluxnet.fluxdata.org/data/fluxnet2015-dataset/>), which includes a lot more site years, especially recent-year data. If the authors can use the 2015 data and obviously there would be more GCC data from PhenoCam sites can be involved. It seems to me a weak point that only one PhenoCam site was used in this study.

There are many grammar mistakes through the manuscript. I strongly suggest the authors seek help to polish the written English in this paper.

Specific points: L17-19: but the authors state that GSI model hasn't been used in LSMs in the main text L52: simulating → simulate L53: delete "change" L59-60: the statement is not right. LAI in CLM can be either prescribed or prognostic. L62: Can you give examples of implicit and explicit+implicit phenology models? L66: starts->originates; add reference to "Reaumur's approach" L79: insert "as" before "important factors" L96-99: please rephrase this sentence. It is not clear whether combining EASS and CLM4 happened firstly or coupling phenology model to DLM happened earlier? L107: common used → widely-used L112: the authors should provide clear reasons why they considered GPP into the analysis in this paper L118: absorbed → borrowed L167: Does CTEM use GSI? If yes, why the authors argue that no LSM uses GSI? L168: Maybe I am wrong, but how net photosynthesis can be positive before leafout? L272: requirements → criteria L275: describe what are Level 3 and Level 4 data? L298: measured → derived L327: position → location L328: I understand there is no overlap between PhenoCam data and fluxnet data at most sites, but please explicitly clarify this point to the readers L334-346 should move this paragraph into discussions L354: change the sentence to: the effects of phenology on GPP can be evaluated by using the two model versions.

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Discussions: Perhaps the authors can make some comments on possible reasons of that DLM-GSI is better than DLM-GDD in their study. Although it is not a must, I believe it will make the paper more interesting.

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