# Responses to Referee #2 comment on "Contrasting behaviors of the atmospheric $CO_2$ interannual variability during two types of El Ninos

Dear Referee and Editor, Thank you very much for your efforts to deal with our manuscript and provide constructive comments. We have tried our best to re-summarize the results, and modify this manuscript accordingly. The following is our point-by-point reply to the comments.

This paper investigates the relationship between atmospheric CO2 inter-annual variability and El Nino events through dynamic vegetation models using the composite analysis technique. Several meteorological factors are considered in the analysis, for example, precipitation and temperature; and radiation data was not included in the analysis. The authors discussed the potential impacts radiation variability could have on the land biosphere dynamics and, subsequently, the atmospheric CO2 inter-annual variability. The title of the paper emphasizes two types of El Nino events, and the authors present a lot of details about these two types of events, but it would be great if the authors could articulate to readers why it's important to separate the two types of El Nino, and its importance to the atmospheric CO2 inter-annual variability and global carbon cycle. In general, I recommend this paper be published.

**Some detailed comments and questions:**

(1) For the TRENDY simulations, are consistent vegetation data used amongst the models?

Reply: Thanks for your comments. In the text, we have illustrated that TRENDY models were forced by a common set of climatic datasets (CRNCEPv6), atmospheric CO2 concentration, and land use datasets and followed the same experimental protocol. And these models are basically Dynamical Global Vegetation Models, so they do not explicitly need the vegetation data (like LAI etc.).

(2) The composite analysis technique is very important in this study. Maybe it's better for the authors to explain briefly in the paper what this technique really is?

Reply: Thanks for your suggestions. We have added a sentence to illustrate the composite analysis as "*More specifically, in terms of the composite analysis, we calculated the averages of the carbon flux anomaly (CGR, $F_{TA}$ i.e.) during the selected EP and CP El Niño events, respectively.*"

(3) The English used in the paper needs further edits to eliminate some grammatical and word usage mistakes.

Reply: Thanks for your suggestions. We have polished the English writing by LetPub.