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Interactive comment on "How drought severity constrains GPP and its partitioning among carbon pools in a *Quercus ilex* coppice?" *by* S. Rambal et al.

Anonymous Referee #1

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This paper analyzed the carbon use efficiency (CUE, the ratio of NPP to GPP) of a Mediterranean forest and its response to drought. It found the CUE is conservative compared with GPP and NPP but still decreases with drought. The data reported in this study is informative and useful to understanding plant responses to drought and modeling studies. The paper is well written overall, but I still have some concerns on the presentation and explanations of the data.

1. The authors also reported heterotrophic respiration (Rh), ecosystem respiration (Reco) and ecosystem net production (NEP) besides GPP, NPP, and Ra that are necessary for estimating CUE. They are not related to the objectives of this study: CUE and its responses to drought. To evaluate Rh, Reco, and NEP, it needs to have the

data of litter and soil carbon decomposition rates that are not described in this study. Reco is the sum of Ra and Rh. NEP is the difference between GPP and Reco, or NPP and Rh. So, they are not independent variables. It seens not necessary to include the data of Rh, Reco, and NEP in this paper.

2. The description of data collection and analysis I can't get a clear picture on how GPP, NPP, and Ra were measured or estimated. I think the sections of 2.2, 2.5, and 2.6 can be put together, because they are all about the estimation of carbon fluxes (GPP, NPP, Ra, et al.). But I still can't get how Ra is estimated. I also don't know how many samples were taken and how the uncertainty of data was estimated. There are no error bars for the data in Fig. 1 (GPP and NPP).

3. Carry-over effect of NPP on CUE The author used different years' GPP, NPP, and soil water stress index to show the relationship between CUE and WSI. But as the authors said "The leaf production was not related to the current year WSI but to the previous year WSI" (line 10, page 8690), the CUE is partly determined by last year's GPP and NPP. So, there are must be some carry-over effects on the estimation of CUE, which would bias the relationship between CUE and WSI. This should be discussed.

Minor concerns: 1. Line 14, page 8681 "water stress integral (WSI)" may be just called "water stress index".

2. Line 17, page 8682 "LMA". Define it before using.

3. Lines 18∼20, page 8683: "They found annual fine root production . . .". This sentence is confusing. It's leaf/root or root/leaf?

4. Lines 17∼25, page 8685 and elsewhere: The authors presented the "CV" of some data. I'm just wondering what "CV" can tell the readers. I think it's just represent "inter-annual variations" of these variables.

5. Line 25, page 8690: Fig. 6 should be Fig. 5

6. Fig. 1 GPP and NEP. I'd like to see NPP in this figure.

7. Fig. 6 curve Ra/GPP. Since CUE (NPP/GPP) has been shown in figure 5, it's not necessary to present Ra/GPP. To me, the figure is redundant. 8. Fig. A2. I'd like to see a curve of LAI vs. WSI?

Interactive comment on Biogeosciences Discuss., 11, 8673, 2014.