

## ***Interactive comment on “Carbon uptake and water use in woodlands and forests in southern Australia during an extreme heat wave event in the ‘Angry Summer’ of 2012/2013” by Eva van Gorsel et al.***

### **Anonymous Referee #2**

Received and published: 14 June 2016

Van Gorsel et al explore the sensitivity of Australian woodlands and forests to an extreme heat wave. Results are interesting but a number of minor steps could be taken to make the results less qualitative. The Discussion section should be expanded somewhat to create a more explicit comparison with other heat waves such as those studied by Ciais, Teuling, and many others. The Discussion section ends on a disappointing note with little in the way of synthesis of results to advance current knowledge. The following minor comments are designed to strengthen what I feel is an interesting manuscript that is of interest to the readership of Biogeosciences, but that needs to stake its claim to novelty.

C1

Many qualitative statements can be avoided; for example what constitutes ‘exceptional’ on line 31? The abstract would be more powerful and citable with qualitative statements instead of quantitative ones.

Define ‘recover quickly’ on page 3 line 16.

I’m confused, the end of the abstract says that CABLE was used but the end of the introduction says that BIOS2 was used.

I understand what is meant by ‘relevant fluxes’ but others outside the eddy covariance community might not.

Why is ‘BGH’ an acronym and how does it abbreviate ‘reference period’? Avoid all acronyms that can be avoided. Please also state the actual name of the flux sites used rather than just the fluxnet acronym at first mention to provide a more complete description of the sites.

The sentence beginning line 16 page 4 includes the classifiers i, ii, iii, and then i again in a single sentence. Sometimes the common name for each species is in parentheses, and sometimes the scientific name is.

Occasional minor typographical issues like the space between 33 and m on page 5 line 3.

With respect to the GIMMS3g FPAR product, what product was used before this update?

More qualitative statements enter the results sections where they should be avoided at almost all costs. What is ‘high’ VPD and ‘very low’ soil water in section 3.1? See also: ‘less pronounced’, ‘similar’, ‘decreased throughout the heat wave’ (by how much?), and ‘unusually high’. A nice statement follows ‘unusually high’: During HW1 they were generally more than 1.5-2 standard deviations ( $\Leftrightarrow$ ) higher than during the same time during the 32 years mean from the background period (BGC). More passages should look like this.

C2

Comma after 'Due to increased surface temperatures' on page 7. (Note 'moreso' following this passage doesn't say much. By how much?)

Superlatives like 'remarkably' and 'even' throughout the manuscript suggest surprise, but should be avoided. The reader knows the heat wave was big.

I don't understand 'daily latent heat flux (Fe)'. Is Fe a new abbreviation for latent heat flux on the daily time scale? In the discussion section on page 9 it is re-defined as F3. Wasn't the first usage of this common term somewhat sooner? Following the re-definition of Fe, the authors abbreviate sensible heat flux as 'Fh', then proceed to immediately not use this new definition in the next line. I recommend removing all abbreviations that are not necessary in this abbreviation-heavy manuscript.

On page 10 note that latent heat flux is also controlled by VPD in addition to soil heat flux and this stomatal control is discussed in the next paragraph.

Please define 'With temperatures clearly above an optimum temperature'. Plants can surprise. What is the optimum leaf temperature range for Eucalyptus? Also, how did photosynthetically active leaf area potentially increase over such a short time period of the heat wave? I feel that this argument should be thought through a bit more. How do results agree or disagree with recent manuscripts by Poulter et al. (2014) and Ahlstrom (2015) on the role of dryland ecosystems in the global C budget? The end of the Discussion section is a bit vague and waves briefly at numerous diffuse threats yet doesn't synthesize results in any of these contexts.

The choice of red and green together in Figure 2 is a bit unfortunate. The legend says that some of the lines are meant to be blue but they appear green in my copy.

I'm not really sure what Figure 4 is telling us; I'm not accustomed to seeing things like incident radiation presented as a boxplot. Figure 5 is more useful.

Is Figure 6 just for one day? The smoothing/averaging treatment of Fig. 5 (and 7) would look nice here too.

C3

Some thin vertical lines would help the multiple box plots be a bit more readable. It's hard to ascertain what corresponds to what.

A table of abbreviations would help.

I feel that Ray Leuning should be included in the Acknowledgements section.

---

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-183, 2016.

C4