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Interactive comment on "Response of vegetation to the 2003 European drought was mitigated by height" *by* S. L. Bevan et al.

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The manuscript by Bevan et al. provides an interesting analysis on the role of tall versus short vegetation in determining the land surface response to drought conditions for the extreme year of 2003. While the effects of the 2003 drought have been extensively reported in the literature, the current study provides an useful contribution to the existing literature by focussing on datasets (e.g., GLAS) and variables (e.g., DTR) that have not been studied in detail for this event. The manuscript is well written and the results are presented in a concise way, maybe even a bit too concise at places (e.g., only few sentences are used for DTR results). I only have two main comments which I believe need to be addressed before the manuscript can be accepted.

My main comment concerns the analysis of the diurnal temperature range (DTR). I

agree with the authors that analysis of DTR response can provide valuable information on drought sensitivity of vegetation – but this requires comparison with DTR conditions during non-drought conditions (or some kind of DTR-climatology). It can be expected that also under normal conditions, the DTR differs between short and tall vegetation due to effects of different roughness, thermal inertia etc. It is thus unclear whether the signal in Fig. 9 reflects drought conditions. I believe the DTR analysis is interesting enough to justify some additional analysis and discussion. As a minimum effort, I believe the authors should produce a similar plot to Fig. 9 showing the correlation between vegetation height and DTR for a non-drought period in August of a different year, to show that during normal conditions the DTR is not so strongly related to vegetation height.

A second comment relates to the mechanism that the authors propose explains the observed signals. Whereas deeper roots under tall vegetation can possibly explain the observed signals in NDVI and DTR, this is definitely not the only possible explanation. There is, for instance, no reason why DTR should stay the same with increasing mean temperature given the strong nonlinearities in radiative and aerodynamic processes. Also, it is likely that tall vegetation has developed better strategies to cope with drought, for instance by reducing stomatal opening in response to high temperatures and VPD leading to higher water availability later during the drought (this process can occur independent of differences rooting depth). The authors should indicate that alternative explanations are possible that can explain the observed differences between short and tall vegetation.

Detailed comments

Line 5, Abstract: What do the authors mean by compensating effects?
Page 16076, Line 10: vegetation index or indices?

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Page 16079, Lines 11–15: At this point no results should be discussed.
Page 16082, Line 25: a 50 km square?
Page 16083, Lines 11–15: The authors mix anomalies and absolute values during drought conditions (see also my main comment). Please discuss DTR in relation to normal summer conditions.
Fig 9, caption: In the Data section, it is mentioned that the DTR product is an 8-day mean. How does this relate to the single date mentioned in the caption (25 Aug)?

Interactive comment on Biogeosciences Discuss., 10, 16075, 2013.