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Interactive comment on "Crop water stress maps for entire growing seasons from visible and thermal UAV imagery" *by* Helene Hoffmann et al.

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Answer to Anonymous Referee #1 (Received and published: 8 September 2016)

Thank you for valuable and constructive feedback!

Referee comment: General Comments: This manuscript presents an interesting case-study of the use of UAV imagery to map water stress over the course of a growing season (3 dates) in a barley field in Denmark. The authors used both RGB and thermal imagery to derive a Water Deficit Index (WDI) that relied on both land surface temperature and vegetation greenness measurements. The paper convincingly demonstrates that the addition of the vegetation greenness index to the water stress index (versus the more common approach that does not do this) is valuable for accurately mapping the spatial and temporal patterns of water stress. Overall, this paper is extremely well

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written, presents strong validation data, and would be a great contribution to the literature – both from a purely remote sensing perspective (UAV applications in general) and from a crop science/agricultural management perspective. Specific Comments: I did not find many problems with this manuscript. I would like to point out a few minor issues, though. Firstly, in Figure 4 – could the authors please explain the data gaps a bit further – why are there no gaps with the RGB imagery, but there are gaps with the thermal imagery?

Answer: The insufficient texture in thermal images (that lead to gaps with no data in the concatenating-process in PhotoScan), is due to a coarser resolution compared to RGB images. PhotoScan is made to be operational with RGB images, not thermal images. This will be more thoroughly explained in text related to Fig. 4.

Referee comment: Secondly, It is challenging in the images presented in Figures 4-6 to clearly understand the patterns of crop ripening versus bare soil. I think it would be helpful to include some labels or annotation, as was done for some of the figures to clearly show examples of these types of locations – for example, to accompany the text descriptions on page 14?

Answer: In a revised manuscript we will highlight locations of ripening crops and soil respectively, to better accompany points made in the text.

Referee comment: Technical Corrections: 1) Title: Would be more accurate to state for "an" entire growing season (not seasons) since it is a single-year study.

Answer: We will include an 'an' in the title, as suggested.

Referee comment: 2) Materials and Methods, 2.1 Site: Lines: 12-13 – missing word or improper word use: "while" - "The upper 0.25 m of the soil profile was homogeneous sandy loam while coarse sand with a relatively poor capacity to retain water below."

Answer: The sentence "The upper 0.25 m of the soil profile was homogeneous sandy loam while coarse sand with a relatively poor capacity to retain water below." will be

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rephrased into ‘The upper 0.25 m of the soil profile consisted of homogeneous sandy loam and coarse sand with a relatively poor capacity to retain water was found below’.

Referee comment: 3) 2.3: Can the authors provide a citation or evidence for the following assumption? “We assumed that ripening barley had a similar greenred DN response to that of bare soil. . .”

Answer: The sentence “We assumed that ripening barley had a similar green-red DN response to that of bare soil. . .” will be rephrased into ‘Based on their color, we assumed that ripening barley and bare soil had a similar green-red DN response. . .’ We hope that this rephrasing clear up uncertainties regarding the sentence.

Referee comment: 4) Figure 4c – is there a better contrast stretch that can be applied to this image to display the true color? It seems highly washed out and difficult to interpret the crop pattern.

Answer: All figures in the manuscript will be uploaded in a better quality. Figure 4c is however homogeneous and only small differences can be seen.

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