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Biogeosciences Discussions

Interactive comment on "Combining multi-spectral proximal sensors and digital cameras for monitoring grazed tropical pastures" *by* R. N. Handcock et al.

Anonymous Referee #1

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In this manuscript the authors describe measurements from two sensor network locations in grazed tropical pastures. The motivation of the analysis is sound; sensor networks provide an alternative to remote sensing in areas where spatial scales do not match and or cloud interferes. However, the implementation leaves a lot to be desired. In short, I think there was no due-diligence in terms of experimental design and or practical engineering.

Experimental design / engineering:

I'll highlight a few of the issues that are most obvious. For example, although the sites were outfitted with Skye multi-spectral sensors, basic meteorological measurements

were largely omitted. I quote "our nodes showed a strong correlation with the average of the precipitation recorded at 'Charters Towers Airport' and 'Townsville Airport' stations, so this station average precipitation was used as the best of the available options for precipitation." I would argue that the best available option would have been physical measurements at both locations.

Given the cost of some of the other sensors, I was surprised that no basic meteorological measurements were made. Given the nature of the sensor network, all infrastructure to transmit data from basic precipitation and temperature sensors would be in place. The lack of reliable precipitation data surely decreases the overall value of the measurements made. Furthermore, the lack of data transmission from all sensors further weakens the case made for networked sensors (e.g. visual imagery).

Physical (biomass) measurements:

I wonder why a proxy method was used to assess the total biomass? I would argue that samples could have been taken from locations outside the sensor range for at least the ungrazed location. The grazed locations might show more variability, but might still have been equally valid (given a large and random sample).

Data processing:

Previous research has shown a strong correlation between GPP and camera derived greenness (Toomey, M. et al. Greenness indices from digital cameras predict the timing and seasonal dynamics of canopy-scale photosynthesis. Ecol. Appl. 25, 99–115 (2015).). However, the approach taken by the authors (mainly an auto white balance setting) would make such an analysis far harder if not impossible. Consequently, there was a need for an additional arbitrary parameter to calculate GLA.

Final analysis:

Given the the known relationship between vegetation greenness (or spectral indices) and the strong regression results are no surprise. More so, the lack of an analysis

which differentiates between the two treatments (grazed / non-grazed) is rather surprising. No reference is made to grazing intensity in any model as a potential confounding factor. At least some measure of grazing intensity as -interacting- covariate should have been in place (cows /ha?).

Although I think the authors are right to recognize the potential of sensor networks, their research fails to illustrate this successfully (technically / methodologically / statistically). Sadly, most of the highlighted issues are methodologically and/or technically, limiting potential ways in which to salvage a field season of measurements.

Interactive comment on Biogeosciences Discuss., 12, 18007, 2015.