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Interactive comment on "Monitoring of carbon dioxide fluxes in a subalpine grassland ecosystem of the Italian Alps using a multispectral sensor" *by* K. Sakowska et al.

Anonymous Referee #3

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The work in this paper is very solid and the analysis is good, but the authors do little to expand the science. This work repeats studies done by others without showing us anything really new. To me, there are a number of questions that can be addressed by this analysis that would make the paper much more interesting and useful to the community.

First, one omission in the methods; there is no description of instrument calibration. Over the long study period, what was done to prevent instrument drift? How stable was the instrument? Is this an issue for anyone else using this type of instrument?

In the introduction the light use efficiency equation (LUE) was introduced (Eq 1). How-

ever, it is not mentioned again in the paper. Of the four different statistical models, only Model 2 directly relates to the LUE, and Model 2 is stated to do poorly. As the LUE is widely used, what do the results of this study say about its applicability? Is PAR unnecessary in the LUE model? If you do need PAR, why did the statistical models that used PAR in them do poorly? Should there be a direct/diffuse ratio added to the model? These are important questions that fall out of your analysis and should be addressed.

The authors suggest that these types of reflectance measurements could be used to determine carbon fluxes and productivity and it would be much cheaper and easier to deploy these optical sensors than flux towers. I wish the authors explored this idea a little farther. How robust are their best models? If the model were parameterized using data from one year, how well would it have performed in the other years? Are there particular times or conditions (e.g. rain or very cloudy conditions) where errors in flux estimation are particularly bad? Are the relationships developed during the spring green-up the same as those for the summer green-up after cutting? Can a brief (say, month-long) training dataset provide a good solution for the rest of the season (or other years)? If the optical data provide a reliable estimate of GEP, could that then be used to estimate daytime respiration? It was also suggested that the optical data could be used to fill in gaps in the flux data. It would be nice to see a test of that idea, by creating gaps of varying sizes at different times of the year and filling them using the optical data. Does a single parameterization work well, or is it better to tune the equations from data surrounding the gap? Perhaps the authors intend to address these kinds of questions in future papers, but not adding something to the discussion in this paper leaves it with little lasting to say.

Interactive comment on Biogeosciences Discuss., 11, 4729, 2014.