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Interactive comment on "Monitoring seasonal and diurnal changes in photosynthetic pigments with automated PRI and NDVI sensors" *by* J. A. Gamon et al.

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Comment 1) The presented study aimed to evidence the relationship between foliar pigments and spectral indices (PRI and NDVI) while testing brand remote sensors for experimental studies. The study is clear, well conducted, scientifically sound and potentially of interest for the public of BG. The main value of the ms is the simultaneous analysis of pigments and spectral indices in one deciduous species and one conifer species and the thorough description of the onset of the growing season. I do not find any new information in this study but known elements already described together in the same place.

Response: While we agree that some similar findings have been presented elsewhere, we note several novel and important aspects to our study. To our knowledge, this is the first published work demonstrating that low-cost SRS sensors can be used to monitor separate pigment effects over contrasting time scales. A key finding was the importance of proper sensors cross-calibration (e.g. correction for sky conditions). Given the frequency and extent of cloud cover for much of the world, this is a significant and useful finding. The direct contrast of PRI and NDVI behavior in deciduous and evergreen species is another novel aspect. To our knowledge these findings have not been presented in this way before.

Comment 2) My main concern is that the study is in some point disappointing. The text starts trying to convince the reader on the importance of vegetation indices as indicators of photosynthetic activity and light use efficiency. However nor direct measurements neither analysis on Carbon exchange were presented. I expected that Carbon net exchange or other direct photosynthetic measurements, LUE or any other direct measurement on what the authors refers as "photosynthetic activity" would be presented. So, we have now clearer ideas on the relationships between PRI and pigments, but we are in the same point on the relationship between PRI and photosynthetic activity.

Response: In this study, a main point was to evaluate novel sensor responses to pigment changes having implications for photosynthetic activity. The link between xanthophyll cycle, chl:carot pigments and photosynthetic activity (or LUE) has been discussed in other papers, several of which are cited in this study. Thus the link to photosynthesis was presented more as essential background material rather than the main focus. Note that it is these pigment changes themselves (not photosynthetic activity or LUE per se) that drive PRI responses, and a novel finding was that these low-cost SRS sensors can effectively monitor seasonal and diurnal pigment shifts. In companion papers (Wong and Gamon 2015a,b), clear links with photosynthesis are made in considerable detail, and we cite these papers in our manuscript. A novel finding of these studies is

that chl:carot pool sizes (not the xanthophyll cycle per se) is the primary driver of PRI over seasonal time scales, and we conclude that much more attention should be paid to the role of these pigment pools in seasonal photosynthetic activity, particularly for evergreens.

Interactive comment on Biogeosciences Discuss., 12, 2947, 2015.