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Interactive comment on "Evaluating remote sensing of deciduous forest phenology at multiple spatial scales using PhenoCam imagery" *by* S. T. Klosterman et al.

Anonymous Referee #2

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General comments: This study provides significant contributions and information about accurate monitoring of phenological transitions in deciduous forests at both near-surface and satellite scales. A novel curve fitting model for time series vegetation index was presented, and its advantageous uncertainty was statistically demonstrated. By applying the common framework of curve fitting, phenology dates were estimated in various metrics of visual assessment, near-surface and satellite remote sensing. Satellite derived phenology dates were validated with near-surface based dates. In results, spring and fall phenophase at both scales were discussed respectively in relation to the spatial heterogeneity. The manuscript is generally well written and proper methods were used to analyze the data. However, now this manuscript is rather like a techni-

cal report of new method. More discussion from ecological and spectral viewpoints of phenology would improve the manuscript.

1)GCC and EVI are calculated by different wavelength, which reflects the different spectral characteristics of vegetation. You need to link the phenological trajectory of each index (Fig. 3) to the spectral implications and physiological phenomena. What stage of phenophase does the spring maximum or fall minimum in GCC and EVI respectively indicate? Please discuss the large biases between remote sensing and near-surface phenology based on the spectral difference.

2)The comparison between the near-surface and remote sensing results would include both implications of the spatial representativeness and the spectral difference between GCC and EVI. You can calculate GCC also from satellite data. When you compare GCC derived from near-surface and satellite, it will be more clarified.

3)Authors estimated phenology in a broad geographic range of deciduous forests, and showed the scatter plots of the near-surface and remote sensing phenology linking with latitude (Fig. 4 and Fig. 5). Some discussions from geographical and ecological aspects of phenology are expected. And please compare these results with previous knowledge of phenology in the same region.

Minor comments: Table 1: 13 Study sites are shown in fig. 1, but 11 sites in this table. Please describe all the sites, and add the information about dominant plant species and the MODIS Land cover category for each site. Page 2314 Line 14 -16, Table Fig. 3: How did you define the start and end of fall in smoothing and interpolation model? Please add the phenology dates (SOF, EOF) in Fig. 3G. Fig. 3: What are the physiological meanings for the minimum values and the later peak of GCC in fall? Was the peak date of RCC equal to the minimum date of GCC? P2316 Line 10-16: The date of canopy maturity derived from near-surface was biased about 9 days earlier than the visual assessment, which still had large uncertainty. However, the EOS in EVI was biased about 9 days later than near-surface greenness (Table. 4), which was identical

BGD
11, C752–C754, 2014

to the EOS by visual assessment. What does the peak greenness mean? Fig. 4: The range of near surface GCC (x-axis) should be the same with that in Fig. 5. The spring and fall phenology dates approximately relate with latitude in Fig. 5, but no relations are found in Fig.4. Why?

Interactive comment on Biogeosciences Discuss., 11, 2305, 2014.