**Biogeosciences
Discussions**

Interactive comment on "Impact of meteorological anomalies in the 2003 summer on gross primary productivity in East Asia" *by* N. Saigusa et al.

Anonymous Referee #2

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Overall this is a very interesting paper and subject of study, both in the evaluation of vegetation responses to a summer anomaly (extreme event?), as well as the idea of merging flux tower resuts with satellite remote sensing. The study, however, appears to fall short on scientific significance, and needs a more rigorous analyses of testing and answering the key questions posed on vegetation responses to the summer 2003 anomaly. There also seems to be a serious weakness in the lack of adequate time series data for an anomaly-based study, as the datasets for all towers never straddle the 2003 anomaly and most sites consist of only 2 years of data.

With respect to a more rigorous analysis, although the anomaly is defined as 'significant', standardized anomalies are not presented nor evaluated in this study. It would be more useful to present the spatial distribution of anomalous vegetation responses

that exceed +/- 1 standard deviation from expected (or normal) interannual variations. This is particularly necessary given that the SVM model comparisons with 5 Asia flux tower sites (Fig. 3) resulted in an RMSE of 2.33 gCm-2 day-1 between the observed and satellite-based GPP, and this uncertainty exceeds by a factor of 2, the anomaly values of this study and presented in Fig. 7.

A key objective of this study is to determine the controlling factors of vegetation responses to the anomaly, but the manuscript mostly focuses on PPFD and does not analyze the role of Temperature. Its not clear why the PPFD anomaly is presented but not temperature (as the rain belt caused cooler temperatures within and warmer temperatures to the south). Many of the controlling factors actually covary (light and temperature, light and rainfall), and this should either be acknowledged and discussed or better yet, statistically evaluated.

The number of study sites is very low, 6 in total, and only 2 are actually within the "rain band" from 30-40 deg latitude, and 1 clearly north and only 1 clearly south of the rain band. The subtropical site is also somewhat artificial in that it is Planted Pine, which is not representative of southeast China (or is it?). Perhaps these limitations should be more seriously considered in the interpretation and discussion of results.

The SVM model and parameters used are basically an Ameriflux-based result (or heavily influenced), causing some issues in using SVM to drive an East Asia vegetation GPP study. In fact, this study could primarily be a satellite study as the role of the 6 flux tower sites has become lost and unknown. Satellite estimates of GPP are available? and the 6 flux tower sites were only partly used to develop the SVM-based GPP model.

Other comments regarding the paper include:

- there are large sections in the Results that belong in the Introduction or Dicussion, such as the teleconnections discussion.

- in the Methods section, there is some very elaborate processing not provided, for

example,"Small gaps (<2–3 h) were linearly interpolated, and larger gaps were filled using empirical functions." This may be acceptable, however, it also would prevent anyone from replicating this study. Also, since the respiration component was handled differently at one site (QYZ), the issue of consistency in processing across sites should be discussed.

- it is not clear why multiple satellites were used (MODIS, SeaWiFs, GLI) when either of the first two, encompassed the study period and provided the geographic coverage?

- why was monthly land-surface reflectance derived with an assumed tropospheric aerosol model and an empirical NDVI relationship, when, for example, the MODIS sensor provides a real-time optical thickness product? This may be of concern, given the anomalous weather conditions, making it less likely that an assumed aerosol model would be valid.

- the evaluation and validation of the PPFD satellite results is incomplete. As the satellites would give an instantaneous measure of PPFD, how exactly were satellite and tower measures validated to the monthly average PPFD (how was the flux tower data aggregated?).

Interactive comment on Biogeosciences Discuss., 6, 8883, 2009.