

## ***Interactive comment on* “Soil moisture controls on patterns of grass green-up in Inner Mongolia: an index based approach” by H. Liu et al.**

### **Anonymous Referee #1**

Received and published: 17 October 2012

#### General Comments:

Overall, this seems like a very useful paper for anyone interested in the controls on plant phenology. It also provides some very interesting ideas for future research. I particularly like the notes about how the control over green-up can switch between temperature and water from year to year, since it gives good insight into how plants respond to various combinations of factors. The organization of the paper is also very clear and logical. One area that I believe needs improvement, however, is that some of the reasoning for the authors’ decisions about which indices work better than others could be explained in more detail (see specific comments).

#### Specific Comments:

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There are many statements on page 11649 (such as “thermal and water conditions have been of most concern” and “it has been common to accumulate the indicator variables over a certain, fixed time span”. . .) that do not include citations. This is not necessarily a problem, but it might be good to include some examples and/or sources to back up these claims.

On page 11654, lines 4-7, I don’t quite understand why stations 6-9 were excluded from the study. Was it because of the unusually high aridity index (as suggested by the use of the word “therefore”) or because of their unusual life cycle (as suggested by the end of the last sentence)?

In page 11655, you say that the most important factor other than the thermal condition is the water condition (line 9). What is your evidence for this?

The reasoning in the first paragraph of page 11656 is not clear. Why is it important that the PSO and GUD values have very little overlap? Isn’t it just important that they be correlated, not that they actually match? The second paragraph of the same page could also use more explanation. You seem to imply that the coefficient of determination value of 0.52 shows that SMSO is superior to PSO in predicting GUD in general. I think that what you really mean, however, is that SMSO is superior to PSO for capturing the variation of GUD with respect to HAI. If I am correct, then you might be able to clear this up simply by changing the last sentence (line 23) to say “. . . capturing observed GUD variations with respect to aridity”.

How is “best regression” (p. 11657, line 9) defined? Do you mean the regression with the highest correlation coefficient?

Do you have any ideas about why all three indices give such a good fit at station 20? That seems worth looking into.

Technical Corrections:

Page 11645, Line 16 – “advanced” should be “advances”

Page 11645, Line 22 – “phonological” should be “phenological”

Page 11645, Lines 26-28 – The sentence “The aim is to . . . Precipitation based index” is a bit confusing. I think adding another comma somewhere would make it clearer.

Page 11646, Line 6 – I suggest changing “as follows.” to “as follows:”

Page 11649, Line 8 – “vegetation” is misspelled.

Page 11649, line 14 and page 11652, lines 4-5 – Using “also” and “as well” in the same sentence is redundant.

Page 11655 – The tense changes from past to future. In line 17 you say the dominant control “may have been”, but in line 20 the dominant control “is”.

Page 11657, lines 10-11 – Change “in none of the stations did the temperature. . .” to “in none of the stations was the temperature. . .”.

Page 11658, line 2 – “retroactively after the fact” is redundant.

Page 11658, lines 4-5 – Change “need to overcoming gaps in predictive understanding the environmental controls” to “need to overcome gaps in predictive understanding of the environmental controls”.

Page 11659, line 5 – I suggest replacing “way” with “method”.

Page 11659, line 9 – It is a bit misleading to use units of mm here when you used units of cm earlier in the sentence.

Figure 9 – change “station numbered 10” to “station number 10”. Also, it might be better to change the caption to say “Annual series of NDVI, air Temperature, Precipitation, and simulated Soil Moisture” so that it is in the same order as the plots.

Figure 10 – Change “station numbered 10” to “station number 10”.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 11641, 2012.