

Interactive comment on “Disentangling the effects of climate and people on Sahel vegetation dynamics” by J. W. Seaquist et al.

N. Zeng (Referee)

zeng@atmos.umd.edu

Received and published: 7 September 2008

Review of: "Disentangling the effects of climate and people on Sahel vegetation dynamics" by W. Seaquist, T. Hickler, L. Eklundh, J. Ardö, and W. Heumann

General Comments:

Since Otterman and Charney's hypothesis in the 1970s on a possible positive feedback between over-grazing, land degradation and reduced rainfall, there has been major concern of a human influence on Sahel drought. Modeling work in recent year have shown that changes in global SST patterns and land-vegetation-atmosphere feedbacks can explain the multi-decadal climate and vegetation variability observed in the 20th century, suggesting that any possible human influence may be secondary. However,

these modeling studies did not address directly how much human activity may (or may not) influence the Sahel climate.

This work by Seaquist et al. provides an analysis of this issue by including the effects of cropping, pasture, population density and population change, concluding that these factors show little correlation, and instead climate is the dominant factor for the greening over last 2-3 decades. I find the analysis comprehensive and the conclusion convincing. The work is sufficiently important and warrants publication in Biogeosciences.

Specific Comments:

a. All the analysis here is based on the trend from 1982-2002 when increased precipitation in the Sahel was apparently the main driver of change. However, this does not exclude possible strong human influence on longer timescales when whole landscape may be transformed by human activities which could have larger impact on climate. The conclusions thus should include caveats that put the analysis in broader context.

b. It seems rather unusual to use the maximum NDVI and modeled LAI for correlation analysis. Although the seasonal cycle may be smooth enough so that the max values would likely reflect overall vegetation growth, but one can not exclude influence from major short-term fluctuations. A more popular approach is to integrate the variables over the whole growing season, or annual mean which would be the simplest thing to do. If the authors choose to stay with max values, it needs to be demonstrated to give similar results as growing season or annual mean.

c. Fig.5a caption states that the x-axis is 'NDVI trend correlation coefficient', while the text says it is 'NDVI trend'. I suspect it is the latter because Fig.5b is the percent change, and the former is not discussed at all. Please clarify.

d. The authors "identify a weak, positive correlation between data-model agreement and pasture intensity at the Sahel-wide level". Because the area with good 'data-model agreement' tends to be where it has been greening in response to increased

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



precipitation over the last 20 years, I wonder if this could be simply due to the possibility that grazing is just following the greening as nomads slowly moved with the rain over the period? Just a conjecture, but it may be possible to test with your data.

e. It may be useful to cite and discuss: Taylor, Christopher M., Lambin, Eric F., Stephenne, Nathalie, Harding, Richard J., Essery, Richard L. H.. 2002: The Influence of Land Use Change on Climate in the Sahel. *Journal of Climate*: Vol. 15, No. 24, pp. 3615�3629.

Interactive comment on *Biogeosciences Discuss.*, 5, 3045, 2008.

BGD

5, S1653–S1655, 2008

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

