

Return to SM

Do you know who brought this?
Hayden says he didn't. I can't place it.
(Coffin?) SM

proposal for LTER intersite synthesis

ECOSYSTEM RESPONSE TO DIRECTIONAL CLIMATIC CH
A MULTISITE ANALYSIS

Premises:

A: Environmental Forcings

- 1. Carbon dioxide enrichment is a uniform forcing over all environmental gradients.
(this sets up some NUE and WUE questions, regardless of other changes)
- 2. Warming effects are regional, and are related to
 - a) greenhouse gases minus sulfur and particulate cooling effects
 - b) changes larger air mass movements (high-low pressure patterns, jet stream, etc.)

B: Ecosystem Responses:

A directional Forcing can produce a complex (multidirectional) response, as mediated by a) organismic physiological responses and/or b) ecosystem shifts (e.g. Figure 1).

Conclusion:

Even under a directional forcing, the system response may be positive, neutral or negative depending upon a) initial conditions of the system and b) magnitude of environmental forcings. The forcings will be a regional and elevational phenomenon.

Proposal: The LTER Network is the appropriate group with the diversity, manpower and data to provide a robust synthesis of biotic response to climate change. It's time to justify the usefulness of the LTER network in the global change arena. Failure to do so will result in this effort being conducted by the biophysicists or done piecemeal, by investigators with site-specific foci. This latter effort will produce conflicting (site-specific) results and will confuse both the public and the politicians regarding the importance of this issue.

Proposed components of research:

- 1. Greenland and Kittel proposal (funded by non-LTER sources)
 - a. completion of climate analysis for all LTER sites
 - b. Summary of GCM predictions for regional area (Figure 2).
 - c. additional benefits
- 2. Retrospective analysis
 - Comparison of site trends with published analyses, hypotheses (e.g. Plantico et al. 1990. Is Recent climate change across the United States related to rising levels of anthropogenic greenhouse gasses? J. Geophysical Res. 95: 16617-16637). This work has already been done at CPER, Konza, Niwot, Northern Lakes, Coweeta (?)......There is at least a BioScience if not a Science article to be done using largely existing analyses.

3. Modeling and prediction. Validation tests of GEM and CENTURY and predictions of climate change across all LTER sites. How well do these two models mimic ecosystem behavior across sites? If both models are adequate, then how do the two models differ in terms of prediction and what are the cause(s) for these differences? Do these differences indicate sensitive parameters?

(Assuming GEM is represented and plugged at this meeting...the following are notes about the current status of CENTURY):

- a. A PC version and user manual is available (Seastedt brought prototype for demo). Hence, it's possible to individual investigators to conduct their own analyses.
- b. This model is up and running at forested and grassland sites (CPER, Konza, Niwot, Coweeta, Luquillo....) in North America, and at many SCOPE or MAB sites in other continents. An agroecosystem version is also up and running.
- c. Recent articles by Burke et al. (1991), Schimel et al. (1991) Seastedt et al. (in press) and others pending and in press have demonstrated that CENTURY can be used for microsite, site and regional questions. Coupling of CENTURY with GCMs is anticipated in the near future.

BIOTIC RESPONSES TO DIRECTIONAL FORCINGS

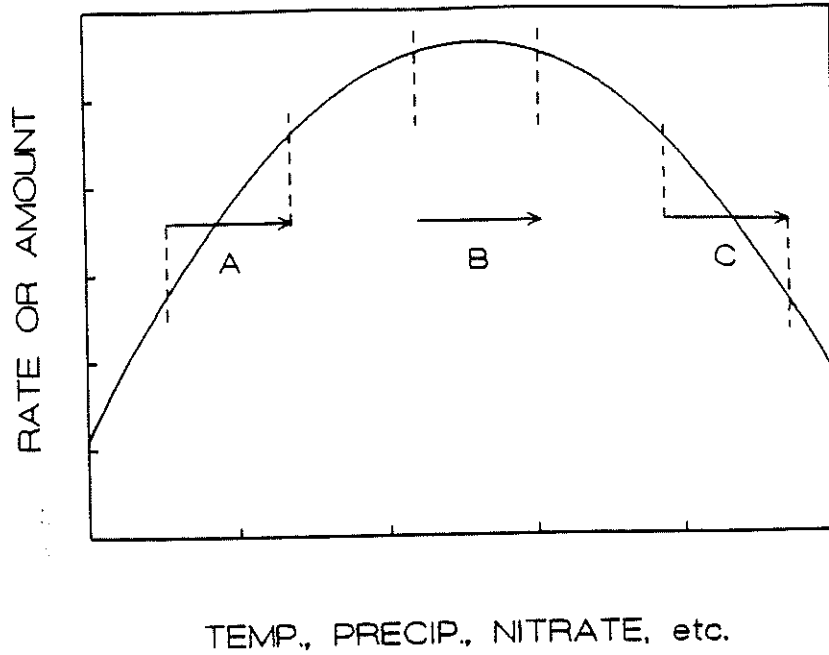


Figure |a. Initial conditions control the magnitude and direction of a directional shift in resources, climate, etc. The biotic response is positive at region A, neutral at region B and negative if change occurs as shown in region C.

BIOTIC RESPONSES TO SNOWDEPTH AND SUMMER PRECIPITATION

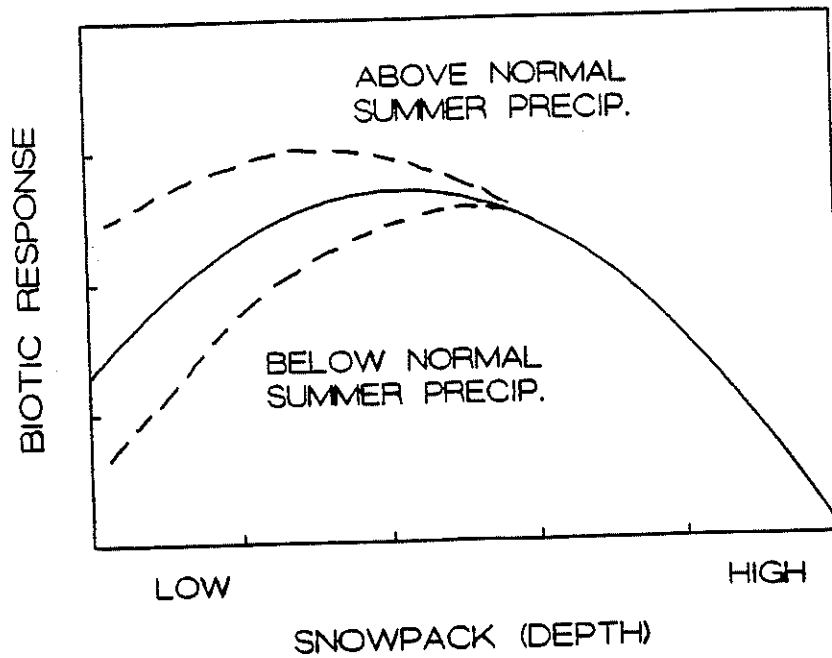


Figure |b. Biotic responses to snowpack, as influenced by summer precipitation, provide a scenario for complex responses to directional change in climate.

Southern Great Plains JJA 2x-1xCO2 Temperature

