

The following prospectus was sent to Mr. Kirk Jensen, Editor of the the LTER Oxford University Press Series on Aug. 25, 2000.

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## **Prospectus for a proposed book entitled**

### **Climate Variability and Ecosystem Response at Long-Term Ecological Research (LTER) Sites.**

**Editors: David Greenland, Andrew Fountain, Douglas Goodin, Glenn Juday, Berry Lyons, Raymond Smith.**

August 24, 2000

#### **Background**

Climate Variability and Ecosystem Response was the title of both a monograph published by the LTER Climate Committee in 1990 and the science theme meeting at the Fall 1997 Long-Term Ecological Research (LTER) Coordinating Meeting. Three workshops on the same topic were held at the August 2000 All Scientists Meeting LTER. The workshops dealt with the overall theme as it applied to the quintennial, decadal, and century to millennial time scales. A series of questions were employed to focus the presentations and discussion on the topic. Material from these meetings and workshops together with selected additional material form the basis of the content of this prospectus.

#### **The Theme of the Book**

The theme of the book is how ecosystems respond to climate variability. This theme is examined at a variety of LTER sites and over a variety of time scales. The subject matter of the book is focussed on a series of questions that are as follows. What is the type of climatic variability being examined at a given LTER site? What pre-existing conditions will affect the impact of the climatic event or episode? Is the effect direct or does it cascade through the ecosystem? Is the effect completed by the time of the next climatic event or episode? Does the climatic event or episode have any identifiable upper or lower limit? Does the climatic event or episode return to an original state? Does the climatic and ecosystem exhibit chaos? Ecosystem related questions are derived from each of these climatic related questions. The aim of the questions is to ensure that the topic is treated in a systematic and thorough manner. A paper by Greenland (1999) provides further discussion of the questions on pages 491-507 in volume 6 of Physical Geography.

#### **The Importance of the Book**

The principal reason that the book is important is that global climate change is a central issue facing the world today. The topic has received intense national and international attention as exemplified by the continuing series of books produced by the Intergovernmental Panel on Climate Change. The issue of potential global warming is constantly addressed by the popular

news media. More specifically, the proposed book is important because LTER sites can provide some unique perspectives on the topic resulting from their large legacy of past ecosystem research and observations and their ability to act as a network and provide intersite comparisons. Furthermore, well over half the LTER sites have a climate investigation component as one of their main working hypotheses and all the sites study the interaction of climate and ecosystems to some degree. The question-oriented organization and some of the results described in it will provide an important stimulus to future research on the topic.

## **Overview of Book**

The book will have four parts.

Part one is an introduction to the general topic of climate variability and ecosystem response jointly written by all the workshop leaders.

Part two forms the body of the work and has four sub parts each one dealing with the separate time scales at which we are looking. Each of these sub parts has an overview and is then followed by chapters from the workshop presenters and those who will guarantee to provide their material in a timely fashion. Contributions will be solicited from other authors to fill gaps not covered by ASM 2000 Workshop presenters. Each sub-part has its own synthesis chapter synthesizing the material and findings as they apply to the time scale of the sub part.

Part three includes chapters from individual sites that cover the topic across all time scales. This material seeks to answer questions that were generated by the LTER Committee for the Synthesis of the Ecological Effects of Climate Change in the 1997 Workshop.

Part four is composed of a conclusion and suggestions for further work - again written jointly by the workshop leaders.

## **Detailed Outline of Chapters**

Proposed authors are suggested. In most cases these people have already agreed to submit material.

**Part 1.** An introduction to climate variability and ecosystem response. David Greenland, Andrew Fountain, Doug Goodin, Glenn Juday, Berry Lyons, Raymond Smith.

**Part 2.** Climate variability and ecosystem response on different time-scales.

## **Short-Term Climatic Events**

Introductory overview - (authored by the overall book authors or one of the contributors to this sub-section).

The impacts of hurricanes in tropical environments - Jess Zimmerman.

The impacts of hurricanes in temperate forests - Emery Boose.

Ecosystem response to drought - Johannes Knops/David Tilman.

The 1988 drought at the Kellogg Biological Station and its region. Stuart Gage.

Synthesis - authored by the overall book authors or one of the contributors to this sub-section).

### **The Quasi-Quintennial Time Scale.**

LTER Network Overview of ENSO climatic signal and response - Introductory overview - David Greenland.

ENSO relationships with climate in the southwestern U.S. - Klaus Wolter.

ENSO effects on the Phoenix Urban Ecosystem. - Anthony Brazel and Andrew Ellis.

Watershed Hydrological and Chemical Responses to Precipitation Variability in the Luquillo Mountains of Puerto Rico. - Douglas Schaefer.

ENSO affects on ice cover and penguins at Palmer (PAL) LTER, Antarctica – Raymond Smith and Bill Fraser.

Climate and hydrologic variations and implications for lake and stream ecological response in the McMurdo Dry Valleys, Antarctica. - Kathy Welch.

Synthesis - Raymond Smith

### **The Inter-Decadal Time Scale.**

Introductory overview - Douglas Goodin and Glen Juday.

Tree-ring records of annual to decadal scale variations in ecological processes in the American Southwest. - Tom Swetman.

The role of interdecadal climate variability in the dynamics of carbon, drought stress and fire as simulated by the VEMAP models - Ronald Nielson.

Impacts of decadal scale climate variability: An assessment of selected LTER biophysical data. - Maurice J. McHugh.

Rapid change in climate and tree ring variables in Boreal White Spruce: A 200 year perspective from interior Alaska - Glenn Juday, Valerie Barber, and Bruce Finney.

Decadal Climate Variation and Coho Salmon Catch - David Greenland.

Century-long changes in storminess at LTER sites. Bruce Hayden.

Synthesis - Maurice McHugh, Doug Goodin and Glen Juday.

### **Century to Millennial Scale**

Introductory overview - Berry Lyons.

The importance of climatic legacy on current ecosystem structure and function in a polar desert. Andrew Fountain and W. Berry Lyons.

Millennial-scale climate changes at the Jornada LTER. H. Curtis Monger.

Millennial and century climate changes in the Colorado Alpine. Scott Elias.

Synthesis - Andrew Fountain.

**Part 3.** Climate variability and ecosystem response at selected LTER sites over multiple time scales.

Response to climate variability at the H. J. Andrews Experimental Forest - David Greenland, Frederick Bierlmaier, Chris Daly, Arthur McKee, Joseph Means, Fred Swanson, and Cathy Whitlock.

Climate and ice variability at the North Temperate Lakes Regional LTER site - John Magnuson.

Human and natural disturbance at the Harvard Forest over 400 years - David Foster et al.

### **Part. 4.**

Climate variability and ecosystem response - an overview. David Greenland, Andrew Fountain, Douglas Goodin, Glenn Juday, Berry Lyons, Raymond Smith.

### **Mechanics**

Each main chapter and part 4 would have about 5000 words (about 15 pages double spaced, 12 point, typescript). Introductory, overview, and synthesis material sections would be between 3 and 5 pages.

We will request the text for the main chapters by Jan 31, 2001 and allow up to March 31 to write the introductory and synthesis material.

Contributing authors will be asked to review the chapters of other authors.

Bruce Hayden will be asked to write a preface and to review the introductory and synthesis material.

For the style to follow the Konza Prairie Synthesis volume will be used as a model. The reference for this is:

Grassland Dynamics: Long-Term Ecological Research in Tallgrass Prairie. 1998. Edited by ALAN K. KNAPP, JOHN M. BRIGGS, DAVID C. HARTNETT, all at Kansas State University, and SCOTT L. COLLINS, National Science Foundation, Virginia. Oxford University Press, New York. 386 pp.; 133 illus.; 6-1/8 x 9-1/4; ISBN 0-19-511486-8.

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