February 1991

Introduction: Climate Change on the Great Plains

Paul A. Kay
University of Nebraska - Lincoln, pkay@fes.uwaterloo.ca

INTRODUCTION:
CLIMATE CHANGE ON THE GREAT PLAINS

The Center for Great Plains Studies has, for the past decade and a half, hosted annual symposia that draw scholars to address topics of regional interest. The symposium topic for 1990, "Climate Change on the Great Plains," was most timely, given the growing concern with global warming heightened by several years of drought stress in the late 1980s. Interest in this topic has a long lineage in the Center: the ninth symposium, in 1985, addressed "Social Adaptation to Semiarid Environments," and issues of drought and environment have appeared often in the pages of *Great Plains Quarterly*. The 1990 symposium comprised 30 papers by university and government scholars in agricultural economics, agricultural meteorology, animal science, English, geography, geology, meteorology, natural hazards, parks and recreation, and remote sensing. An art exhibition ("Of the Sky"), a poetry reading, and special addresses (including one by Ian Frazier, author of *Great Plains*) also occurred.

A scientific consensus has emerged that the future of the Great Plains in a globally warmer climate will likely be hotter and drier than the last half of the twentieth century. Several authors in this issue provide citations to the work of modelers to support that supposition. We do not yet know with any certainty, however, what spatial and temporal patterns such changes will entail. Standing at the threshold of the new century, what can we say about the impacts of climate changes on the Great Plains by looking back? What lessons might we draw from those changes that will guide us into the uncertain future? The papers in this first issue of *Great Plains Research*, all drawn from the 1990 Symposium, address those questions.

This issue begins with five papers from the natural sciences that set the stage for our understanding of climatic variability. The first two consider paleoclimates on very different temporal scales. Vance Holliday reviews the sedimentary record of the last 11 million years. Aridity and eolian activity have been consistent elements of the southern Plains environment with episodic behavior at time and space scales much larger than those of recent events, such as the Dust Bowl, that concern our society. The geological record, then, does not promise any easy relief to the stress of the environment for human activity. Cary Mock's period of analysis is the late nineteenth century. His study of what instrumental data existed prior to the establishment of the national weather network adds to our knowledge of time and space patterns of drought during the period of Anglo-American settlement. He indicates an absence of cycles some have seen in twentieth-century data.

The next three papers represent analyses of modern meteorological records to elucidate patterns of variability in the present climate. Daniel Leathers shows that seasonal patterns of above and below average temperature and precipitation are related to major patterns of atmospheric circulation. Michael Keables adds streamflows explicitly to the analysis. While some modes of variability of circulation have no hydroclimatic significance, others produce distinctive regional patterns of above and below normal flows. David Robinson and Marilyn Hughes consider the variability in the duration of snow cover and its relationship to other climatic variables. Such studies as these three help us understand how the climate system works and the causes of variability. The results may be used to interpret and test paleoclimatic inferences from proxy data and output from climatic models. Only by knowing the present and recent past can we hope to appreciate likely futures.

Three subsequent papers address social science perspectives of climatic variability. David Diggs asks how farmers on the Plains come to form their opinions of whether the climate is changing, given that expert opinion of scientists is not uniform. Most farmers seem to project the future from their own experiences with recent drought. If that is so, it may be difficult after a wet or normal episode to plan for a dry future. William Riebsame identifies two paradigms, adaptation and resilience, for interpreting societal adjustment to climatic change. His schematic model of stepwise adjustment offers an optimistic view of the social dislocation that a future warmer and drier climate might entail. Unlike the other papers, Craig Marxsen's focus is not specifically the Great Plains, but as he notes changes in interest rates and petroleum supplies are critical issues to residents of the region. His suggestion that manipulation of real interest rates may alter petroleum production may offer an innovative approach to the global "greenhouse warming" problem.

Natural scientists have much to learn about environmental variability and response to global change. Social scientists need to draw upon those findings in their attempts to understand the relationship of societies to their environment. The unifying thread is the question of sustainment of the Great Plains. This collection of papers contributes to communication in a multidisciplinary arena on a topic of mutual concern. *Great Plains Research* is committed to continuing this contribution.

Paul A. Kay