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CHANGES IN ARCTIC CLIMATE AND CENTRAL U.S. WEATHER PATTERNS Is There a Link?

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The United States assumed chairmanship of the Arctic Council in April 2015, making the workshop topic timely. Given the importance of the Midwest and Great Plains region as a breadbasket of the world, the goal of the workshop was to explore how changing Arctic weather patterns may affect agriculture, water resources, and other sectors. The workshop provided an opportunity to identify possible adaptation and mitigation measures in response to these changes in severe weather patterns and extreme climate events, as well as to ascertain future research needs and to discuss how management decisions and policy options may need to be altered in the region in response to a changing climate.

Sponsors of the meeting included the National Oceanic and Atmospheric Administration’s (NOAA) National Integrated Drought Information System, the U.S. Department of Agriculture’s (USDA) Office of the Chief Economist, and numerous entities at the University of Nebraska.

WORKSHOP FRAMEWORK, DISCUSSIONS, AND CONCLUSIONS. The workshop was organized around a series of plenary sessions to discuss the Arctic connection to changes in extreme weather (observed and projected) in the midlatitudes and the implications of these changes on the water regimes and agricultural production systems in the Midwest region. Discussion centered on how to build greater resilience in these systems, and the implications of...
climate change on agriculture and water management
in the region. Highlights of the plenary sessions were
presentations by Jennifer Francis, Rutgers, The State
University of New Jersey, on the Arctic connection
to extreme weather in the midlatitudes, and Karen
Florini, deputy special envoy for climate change in the
U.S. Department of State, on the goals of the Arctic
Council while under U.S. leadership, as well as the
2015 United Nations Climate Change Conference
(COP 21), held in Paris, France. The program also
included a stakeholder panel to discuss management
strategies associated with a changing climate from
local, regional, and global perspectives. Following
breakout sessions directed at identifying adaptation
and mitigation strategies in the agricultural and water
resources sectors, the workshop concluded with a
session that focused on how to engage stakeholders
and communicate scientific information to the user
community. During the plenary sessions, it was indi-
cated that research suggests a rapidly warming Arctic
will favor more persistent weather patterns, leading
to longer dry, hot, wet, and cold spells (but cold spells
will be weaker), day-to-day weather variability will
decrease while extremes causing “weather whiplash”
will increase, and Arctic amplification will continue
to augment some natural patterns to foster more
extreme weather events. Changes observed in the
Arctic have been dramatic and it is likely that strong
warming and the large variability in sea ice/snow
cover in the region could be influencing midlatitude
weather. It was noted that Arctic variability influences
midlatitude weather through wave interference and/
or jet stream characteristics and that sea ice change
caused by human-induced greenhouse gas emissions
is currently a major climate change driver in the
Arctic. Recent research has indicated that late winter/
early spring months are trending toward more ridging
in the Pacific Ocean and this is independent of ENSO.
Ridging is also leading to monthly and seasonal pre-
cipitation trends across the United States, especially
an increased trend for precipitation in the Midwest
during late winter and early spring and a decreased
trend for precipitation in the western United States.

From a water management/water regime perspec-
tive, the forecasts are for warming temperatures,
with more precipitation for some regions and less for
others. We can expect more variable weather within
and among seasons and a shifting seasonality of
precipitation. This is all occurring at a time when we
know that we will be facing a higher demand for food,
feed, and fiber. However, our ability to predict these
climatic extremes with current models is limited.
Improved management of recent droughts provides
some reason for hope in dealing with potentially
longer, more frequent, and more severe droughts in
the future. However, we are still relatively low on the
learning curve with regard to improving drought
management.

From an agricultural perspective, creating a
greater resilience to drought and other extreme
events requires a soil to supply water and nutrients
throughout the life cycle of the plant, a cropping sys-
tem that can withstand the stresses imposed by more
variable and extreme weather, and an integration of
genetics and management to offset the environ-
mental impacts. Enhancing soil health will increase
the capacity of the agroecosystem to be resilient.

Given all of these changes (observed and projected),
it is imperative that we improve our ability to match
forecasts with decisions. Crop models can help to
determine the probabilities of yield under differing
climate scenarios.

Agricultural producers want and need reliable and
understandable information to make management
decisions, assistance with processing the informa-
tion and management options, financial incentives
to help adapt to changing weather patterns (for
cropping, equipment, markets, and water use), and
private and public sector research that emphasizes
drought-tolerant crops, crops that sequester more
carbon, improved water use and efficiency, and a
greater understanding of changing weather patterns
and how to build soil health and livestock manage-
ment challenges in light of a changing climate. It was
also noted that federal crop insurance must provide
management tools and products that help manage the
increased risk associated with climate change.

The farm bill approved by the U.S. Congress was
brought up frequently in discussions during the work-
shop within the context of changing the focus of the
legislation to recognize the importance of adapting
to a changing climate and to provide support and in-
centives for changing current management practices.
The workshop report and key PowerPoint pre-
sentations are available online (http://go.unl.edu/
arcticclimateworkshop).

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