

Alaska Climate Science Center

U.S. Geological Survey / U.S. Department of the Interior
in collaboration with the University of Alaska, Fairbanks

The Alaska Climate Science Center (AK CSC) was established in 2010 by the U.S. Department of the Interior (DOI) to address the challenges presented by climate change and variability in Alaska.

The center is a federally-led research collaboration hosted by the University of Alaska, Fairbanks and brings together the expertise of federal and university scientists to address the priorities of federal, state and tribal resource managers.

Its purpose is to provide scientific information, tools, and techniques that managers and other parties interested in land, water, wildlife and cultural resources can use to anticipate, monitor and adapt to climate change.

2010-11 Alaska CSC Highlights

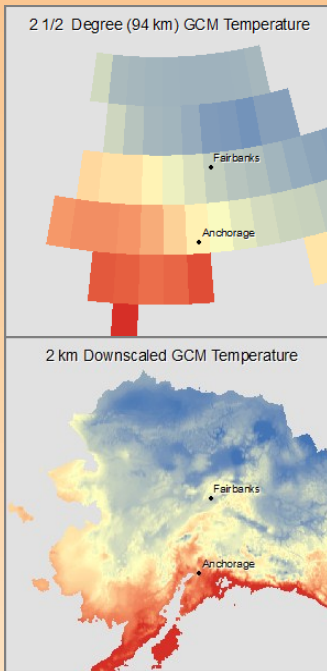
AK CSC Ribbon Cutting Ceremony

Alaska Climate Downscaling Workshop

\$1.7 million funded to AK CSC and LCC projects

20+ staff, students & faculty supported by AK CSC

Alaska Climate Downscaling Workshop



One of the first endeavors of the Alaska CSC was to connect the climate science research community with stakeholders to advance regional climate understanding and research in Alaska. The result was a region-specific Climate Downscaling Workshop held on 28-29 April 2011 in Anchorage, Alaska. The workshop provided a forum for scientists and user groups to:

- (1) Explore state-of-the-art techniques and methodologies for downscaling climate data;
- (2) Understand current science capacities in Alaska and learn about new initiatives and future capacity in the state;
- (3) Set an agenda to address Alaska's science and management needs that provides capacity-building recommendations.

This workshop identified several important recommendations, including the need for better understanding of the science and application of downscaling and a need to develop downscaling best practices.

For more information and resources on the Climate Downscaling Workshop, visit <http://csc.alaska.edu/science>.

New Researchers at the Alaska Climate Science Center

- **Dr. Stephanie McAfee**, Postdoctoral Fellow: Climate model downscaling
- **Dr. Alessio Gusmeroli**, Postdoctoral Fellow: Permafrost Hydrology
- **Katrina Bennett**, Doctoral Research Assistant: Influence of Climate Change on Regional Hydrologic Extremes in Interior Sub-Arctic Alaskan Watersheds
- **Carson Baughman**, Graduate Research Assistant: Controls and consequences of peat in a permafrost landscape on Alaska's North Slope
- **Rick Lader**, Graduate Research Assistant: Intercomparison and validation study of reanalysis models for Alaska
- **Earnest Eckerson**, Undergraduate Research Assistant: Freshwater discharge from Alaska glaciers
- **Brittany Bennett**, Undergraduate Research Assistant: Population-level responses of Alaska wildlife species to short- and long-term effects of climate change on the environment

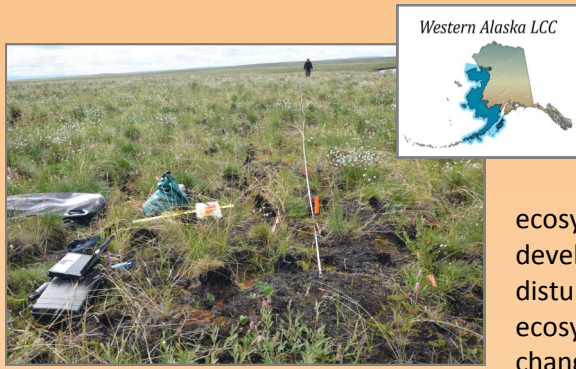
Graduate Research Profile: Katrina Bennett, PhD Candidate

Influence of Climate Change on Regional Hydrologic Extremes in Interior Sub-Arctic Alaskan Watersheds

Climate change is anticipated to change the frequency, intensity, spatial extent and duration of extreme climate and weather events at global, regional and local scales. However, retrospective analysis and future hydro-climate projections focused on the changes in extreme events in Arctic regions of the globe is lacking. Given this knowledge gap, the aim of my PhD thesis is to study extreme hydro-climate events for historical and future time periods through the use of hydrologic models driven by dynamically downscaled RCM data in several sub-Arctic river watersheds located in Interior Alaska. An improved understanding of historical and future projected changes in extreme hydro-climate events in sub-Arctic regions will be useful for communities and planners seeking to understand the historical regime, and prepare for potential future changes in these regions.

Alaska CSC On the Web:

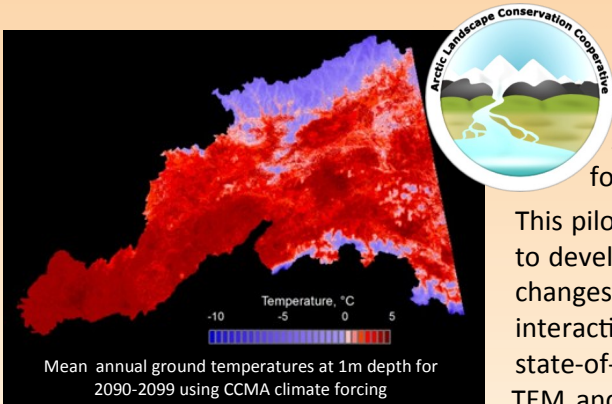
The Alaska CSC can be found on the web at: <http://csc.alaska.edu> and <http://www.doi.gov/csc/alaska/index.cfm>.



Characterizing Post-Fire Successional Trajectories in Tundra Ecosystems

This project aims to assess the effect of wildfire disturbance on tundra ecosystems in western Alaska. The interactions among fire, vegetation, and climate are crucially important to understanding ecosystem functioning at multiple spatial and temporal scales. We are developing a conceptual modeling framework that integrates wildfire disturbance, vegetation succession and climate dynamics in tundra ecosystems to inform land managers of the implications of a changing fire regime. The products resulting from this project that will

benefit decision support include: improved baseline data for understanding vegetation communities found on the Seward Peninsula, maps of changes in vegetation and soil conditions as the result of wildfire, and a technical report for use by land managers to assess tundra fuel loads.



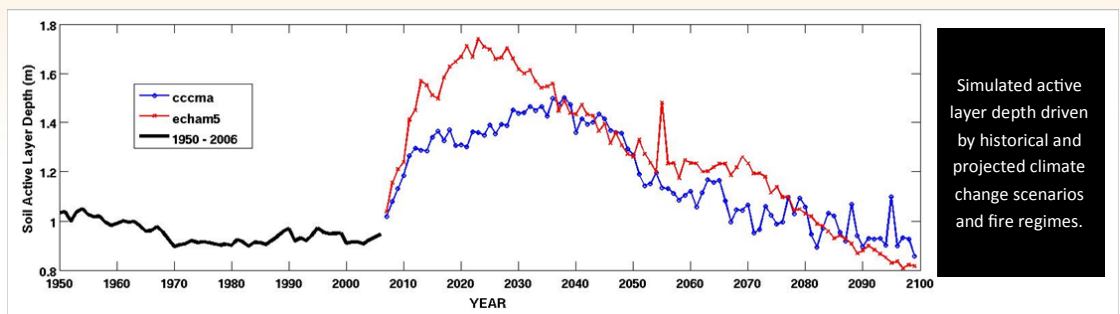
Integrated Ecosystem Model for Alaska

The Alaska Integrated Ecosystem Model (AIEM) uses down-scaled climate models as the drivers of ecosystem change to produce forecasts of future fire, vegetation, permafrost and hydrologic regimes.

This pilot project initiated a long-term integrated modeling project that aims to develop a dynamically linked model framework focused on climate driven changes to vegetation, disturbance, hydrology, and permafrost, and their interactions and feedbacks. A conceptual framework that dynamically links state-of-the-science models of ecosystem processes in Alaska – ALFRESCO, TEM and GIPL – has been defined, and primary model input datasets have

been developed. Additionally, a proof-of-concept asynchronous coupling exercise has been completed. Those preliminary results, simulated across the Alaska portion of the Yukon River Basin, suggest under future climate warming and predicted fire regime changes, areas underlain by no permafrost or deep permafrost would likely expand eastward and northward rather rapidly by 2050.

In the next phase of this multi-year project, which is already underway, our objectives are to synchronously couple the models, develop datasets for Alaska and adjacent areas of Canada, and phase in additional capabilities necessary to address the effects of climate change.



Working with our LCC partners we identified three priority issues that need to be incorporated into the model: (1) tundra fire and treeline dynamics, (2) landscape-level thermokarst dynamics, and (3) wetland dynamics. Ultimately, this tool will provide an integrated framework for natural resource managers and decision makers and produce specific scenarios of changes in landscape structure and function that could be used by resource-specific impact models.

Alaska CSC Developments:

- In collaboration with the Arctic LCC, the AK CSC developed additional secure data access capabilities for the North Slope Science Initiative data catalog.
- The AK CSC funded the Alaska Data Integration Working Group's project to create an Alaska project metadata standard, exchange protocol, and software implementation with the Geographic Information Network of Alaska.

AK CSC Ribbon Cutting

On February 24, 2011, the Alaska Climate Science Center became the first CSC to officially open its doors. Hosted by the University of Alaska, Fairbanks, the Alaska Climate Science Center is a 2500 square foot office suite located at the UA Diplomacy building in Anchorage. The CSC office suite is home to Director Stephen Gray, as well as some of our research staff.



Alaska Climate Science Center:

Dr. Stephen Gray, Director, AK Climate Science Center

Dr. Scott Rupp, Principal Investigator, University of Alaska Fairbanks

University Leadership Team:

Dr. Larry Hinzman, UAF, Director, International Arctic Research Center

Dr. Sarah Trainor, UAF, Alaska Center for Climate Assessment & Policy, P.I.

Dr. Douglas Causey, UAA, Professor and Chair, Biological Sciences

Dr. Andy Kliskey, UAA, Associate Professor of Biological Sciences

Dr. Eran Hood, UAS, Associate Professor of Environmental Science, Department Chair



Photo: Scott Rupp



Photo: Ned Rozell

Climate Research at University of Alaska Fairbanks:

Alaska Center for Climate Assessment and Policy:

<http://accap.uaf.edu>

Alaska Climate Research Center:

<http://climate.gi.alaska.edu>

International Arctic Research Center:

<http://iarc.uaf.edu>

Scenarios Network for Alaska and Arctic Planning:

<http://snap.uaf.edu>

