



**US Army Corps  
of Engineers®**  
Engineer Research and  
Development Center

# Climate Change Research at CRREL

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**Problem** Climate research at CRREL is directed at understanding past and present climate changes, and improving the prediction of future climate change. The research emphasizes the measurement and modeling of critical climatic processes ranging from the local scale to the global scale. Understanding these processes is essential for predicting the impacts of climate change and extreme events on the terrestrial and battlespace environments.

**Description** CRREL research on ice cores from glaciers and polar ice sheets, cores from tree rings, and ocean-floor sediments provides a timeline of changes from the Ice Ages to the present day. Analysis of the evidence from past climate adds to our understanding of the present climate.

Measurements by CRREL of the modern climate incorporate new technologies, deployed on a wide range of land and ocean-based platforms, into the developing global monitoring network. Satellite-based data also figure prominently in efforts to assess climatic conditions. Accurate measurements of the interactions between the atmosphere, ocean, land, and ice are essential for determining the impacts of climate variability on the environment.

One challenge of climate change is predicting impacts on the local and regional scale. A reduced Arctic ice cover would produce changes in shipping, trade, ecosystems, and security. Coastal infrastructure may need protection from rising sea level and erosion. Heat waves and droughts are also predicted to affect both ecosystems and populations. Understanding and predicting the impact of climate change is essential for making the best strategic plans for environment stewardship, mitigation, and adaptation to climate change.

**Expected Products** Global and regional models of climate change are being improved through development of realistic models of physical processes. Improving climate models requires expanding the scope and accuracy of field observations, as well as new approaches in numerical modeling. These models are used to produce more reliable predictions of global and regional climate change and its associated impacts.

**Potential Users** Military strategists will need to account for the impacts of climate change in the coming years as terrestrial processes are affected. Military tactical plans will need to reflect changes in seasonal extents of snow, ice, and navigable weather and ground conditions. Civilian agencies planning new infrastructure need to know how these changes affect their projects, and whether extreme events will have greater impacts over time. Federal agencies that report on climate observations can make use of CRREL's remote observing technology.

**Projected Benefits** Understanding terrestrial and atmospheric processes leads to improved predictions of the state of the terrain and impacts on Army mobility, agility, and effectiveness. This research is intended to improve the all-season and all-weather capabilities of Army Object Force and Future Combat System (FCS) ground and flight operations. Predictions of climate change will aid in improving military and civilian readiness for extreme conditions such as heat waves, drought, and flooding.

**Program Manager**

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