

An Abrupt Climate Change Scenario and Its Implications for United States National Security

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Imagining the Unthinkable

The purpose of this report is to imagine the unthinkable – to push the boundaries of current research on climate change so we may better understand the potential implications on United States national security.

We have interviewed leading climate change scientists, conducted additional research, and reviewed several iterations of the scenario with these experts. The scientists support this project, but caution that the scenario depicted is extreme in two fundamental ways. First, they suggest the occurrences we outline would most likely happen in a few regions, rather than on globally. Second, they say the magnitude of the event may be considerably smaller.

We have created a climate change scenario that although not the most likely, is plausible, and would challenge United States national security in ways that should be considered immediately.

Executive Summary

There is substantial evidence to indicate that significant global warming will occur during the 21st century. Because changes have been gradual so far, and are projected to be similarly gradual in the future, the effects of global warming have the potential to be manageable for most nations. Recent research, however, suggests that there is a possibility that this gradual global warming could lead to a relatively abrupt slowing of the ocean's thermohaline conveyor, which could lead to harsher winter weather conditions, sharply reduced soil moisture, and more intense winds in certain regions that currently provide a significant fraction of the world's food production. With inadequate preparation, the result could be a significant drop in the human carrying capacity of the Earth's environment.

The research suggests that once temperature rises above some threshold, adverse weather conditions could develop relatively abruptly, with persistent changes in the atmospheric circulation causing drops in some regions of 5-10 degrees Fahrenheit in a single decade. Paleoclimatic evidence suggests that altered climatic patterns could last for as much as a century, as they did when the ocean conveyor collapsed 8,200 years ago, or, at the extreme, could last as long as 1,000 years as they did during the Younger Dryas, which began about 12,700 years ago.

In this report, as an alternative to the scenarios of gradual climatic warming that are so common, we outline an abrupt climate change scenario patterned after the 100-year event that occurred about 8,200 years ago. This abrupt change scenario is characterized by the following conditions:

- Annual average temperatures drop by up to 5 degrees Fahrenheit over Asia and North America and 6 degrees Fahrenheit in northern Europe
- Annual average temperatures increase by up to 4 degrees Fahrenheit in key areas throughout Australia, South America, and southern Africa.
- Drought persists for most of the decade in critical agricultural regions and in the water resource regions for major population centers in Europe and eastern North America.
- Winter storms and winds intensify, amplifying the impacts of the changes. Western Europe and the North Pacific experience enhanced winds.

The report explores how such an abrupt climate change scenario could potentially de-stabilize the geo-political environment, leading to skirmishes, battles, and even war due to resource constraints such as:

- 1) Food shortages due to decreases in net global agricultural production
- 2) Decreased availability and quality of fresh water in key regions due to shifted precipitation patterns, causing more frequent floods and droughts
- 3) Disrupted access to energy supplies due to extensive sea ice and storminess

As global and local carrying capacities are reduced, tensions could mount around the world, leading to two fundamental strategies: defensive and offensive. Nations with the resources to do so may build virtual fortresses around their countries, preserving resources for themselves. Less fortunate nations especially those with ancient enmities with their neighbors, may initiate struggles for access to food, clean water, or energy. Unlikely alliances could be formed as defense priorities shift and the goal is resources for survival rather than religion, ideology, or national honor.

This scenario poses new challenges for the United States, and suggests several steps to be taken:

- Improve predictive climate models to allow investigation of a wider range of scenarios and to anticipate how and where changes could occur
- Assemble comprehensive predictive models of the potential impacts of abrupt climate change to improve projections of how climate could influence food, water, and energy
- Create vulnerability metrics to anticipate which countries are most vulnerable to climate change and therefore, could contribute materially to an increasingly disorderly and potentially violent world.

- Identify no-regrets strategies such as enhancing capabilities for water management
- Rehearse adaptive responses
- Explore local implications
- Explore geo-engineering options that control the climate.

There are some indications today that global warming has reached the threshold where the thermohaline circulation could start to be significantly impacted. These indications include observations documenting that the North Atlantic is increasingly being freshened by melting glaciers, increased precipitation, and fresh water runoff making it substantially less salty over the past 40 years.

This report suggests that, because of the potentially dire consequences, the risk of abrupt climate change, although uncertain and quite possibly small, should be elevated beyond a scientific debate to a U.S. national security concern.

