

Likely impact of Antarctic sea ice loss on shifting sociocultural values

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“The profound life lesson Kingfisher takes away from this horrific situation is now solemnly philosophized: – No utility compares to that of escaping an illicit dream, alive and better off, still intact!”

–In “The Philosophy of Awakening”; [The Kingfisher Story Collection](#) (2022)

[SCIENCE COMMUNICATION]

In 2023, Antarctic sea ice declined to historically low levels, prompting researchers to use CMIP6 climate models to assess the event’s rarity and connection to climate change. The study found such a drastic reduction would be extremely rare without climate change, but current climate conditions made it more probable. The unprecedented Antarctic sea ice loss in 2023 underscores the urgency of addressing climate change and its effects on our planet. The study provides valuable insights into such events and potential consequences.

1. Sea ice loss in 2023

Antarctic Sea Ice Decline: In 2023, the Antarctic sea ice shrank to historically low levels, with winter ice coverage falling more than 2 million square kilometers below normal—roughly equivalent to ten times the size of the UK. This significant decrease was particularly striking given the steady increase in sea ice observed up until 2015, making the abrupt drop even more unexpected.

CMIP6 Climate Models: Researchers from the British Antarctic Survey (BAS) investigated

this unprecedented sea ice loss using a large climate dataset called CMIP6. They analyzed data from 18 different climate models to understand the probability of such a significant reduction in sea ice and its connection to climate change.

Probability and Rarity: Lead author Rachel Diamond explained that while 2023's extremely low sea ice was made more likely by climate change, it was still considered very rare according to the models. According to the models, the record-breaking minimum sea ice extent would be a one-in-a-2000-year event without climate change. Anything less than one-in-100 is considered exceptionally unlikely.

Climate Change Impact: As indicated by rising temperatures, strong climate change makes it four times more likely to see a big decline in sea ice extent. The potential long-term reduction in sea ice poses serious consequences for global weather patterns and marine ecosystems.

Ongoing Studies: Understanding and forecasting future changes require ongoing studies to monitor sea ice behavior. The drastic reduction observed in 2023 highlights the need to address climate change and its impact on polar regions.



Illustration: Antarctic sea ice declined to historically low levels in 2023.

2. Views relevant to the information processing approach under mindsponge theory

Antarctic sea ice is crucial in shaping global climate through various interconnected processes. Let's explore how it impacts our planet.

Albedo Effect: The most significant impact of Antarctic sea ice is related to its albedo effect.

Albedo refers to the reflectivity of a surface. White ice and snow have high albedo—they reflect a large portion of incoming solar radiation back into space. When sea ice covers large areas of the Southern Ocean, it reflects sunlight, helping to cool the Earth. This cooling effect is essential for maintaining the planet's overall energy balance.

Ocean Circulation and Heat Exchange: Antarctic sea ice influences ocean circulation patterns. As sea ice forms, it releases salt into the surrounding seawater, increasing its density. This dense, cold water sinks and contributes to the formation of deep ocean currents. These currents transport heat around the globe, affecting climate and weather patterns. Changes in Antarctic sea ice extent can alter this circulation, impacting heat exchange between the ocean and the atmosphere.

Climate Feedback: Melting sea ice contributes to rising sea levels, which can affect coastal regions worldwide. As sea ice melts, it releases freshwater into the ocean. This influx of freshwater can disrupt ocean salinity gradients and affect ocean currents. For example, it can weaken the Atlantic Meridional Overturning Circulation (AMOC), a critical component of global climate regulation. Additionally, releasing stored nutrients from melting ice can influence marine ecosystems and carbon cycling.

Climate Models and Predictions: Scientists use climate models to study the impact of changing sea ice on global climate. These models simulate interactions between sea ice, ocean currents, and the atmosphere. Predictions suggest that continued loss of Antarctic sea ice due to climate change could amplify warming trends, alter precipitation patterns, and affect weather extremes.

Feedback Loops: The reduction of sea ice can lead to positive feedback loops. For instance, less sea ice means more open water, which absorbs more sunlight and warms the ocean. Warmer oceans can accelerate the melting of glaciers and ice sheets on land, contributing to sea level rise. As ice sheets melt, they release freshwater, further affecting ocean circulation and potentially disrupting climate patterns.

Given the critical importance of Antarctic sea ice in Earth's climate system, monitoring and understanding changes in Antarctic sea ice are essential for predicting and mitigating the impacts of climate change.

3. The multifaceted implications of the unprecedented Antarctic sea ice loss on shifting sociocultural values

While the direct impact of the unprecedented Antarctic sea ice loss on sociocultural values may not be immediately apparent, several indirect effects can shape human perspectives

and behaviors as follows.

Environmental Awareness and Activism: The drastic reduction in Antarctic sea ice serves as a stark reminder of the urgent need to address climate change. As news of such events spreads, it can raise environmental awareness among individuals and communities.

Sociocultural values may shift toward greater concern for the planet, leading to increased activism, participation in climate-related movements, and demands for policy changes.

Global Cooperation and Diplomacy: Climate change is a global challenge that requires collaborative efforts. The Antarctic ice loss highlights the interconnectedness of ecosystems across continents. Sociocultural values may evolve to prioritize international cooperation, scientific collaboration, and diplomatic efforts to mitigate climate change. People may recognize the shared responsibility for safeguarding our planet.

Ethical Considerations and Responsibility: The impact of climate change extends beyond national borders. As sea ice melts, it affects sea levels, weather patterns, and ecosystems worldwide. Sociocultural values may shift toward recognizing a collective ethical responsibility to protect vulnerable regions like Antarctica. Individuals and societies may feel compelled to take action to prevent further ice loss.

Cultural Narratives and Symbolism: Antarctica has long symbolized pristine wilderness and scientific exploration. Its ice-covered landscapes evoke wonder and reverence. The loss of Antarctic sea ice disrupts these cultural narratives. Artists, writers, and filmmakers may incorporate this theme into their work, emphasizing the fragility of our planet and the need for preservation.

Education and Curriculum: The Antarctic ice loss can become part of educational curricula. Schools and universities may integrate it into science, geography, and environmental studies. Sociocultural values may evolve as younger generations learn about climate change, its consequences, and the importance of sustainable practices.

Economic Shifts and Adaptation: The impact of melting ice extends beyond environmental concerns. It affects fisheries, shipping routes, and tourism. Sociocultural values may adapt to economic shifts—for instance, valuing sustainable fishing practices or supporting eco-friendly tourism.

Media Influence and Public Perception: Media coverage of the Antarctic ice loss shapes public perception. News articles, documentaries, and social media posts contribute to collective understanding. Sociocultural values may be influenced by how the media frames

the issue—whether emphasizing urgency, resilience, or the need for global action.

To sum up, while the direct impact of Antarctic sea ice loss on sociocultural values may not be immediate, its ripple effects—through education, media, and global consciousness—can gradually shape how humanity perceives and responds to climate change.

References

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