OKJOKULL GLACIER: ENVIROMENT

NEWS: 1st glacier declared dead from climate change seen in before and after images — Earth from space

WHAT'S IN THE NEWS?

Satellite Images and Okjökull Glacier: Satellite images taken over a span of more than three decades have shown the complete disappearance of Okjökull, Iceland's first glacier to be officially declared dead due to human-caused climate change in 2014. This event highlights the alarming rate of glacial retreat due to the global warming crisis, which is drastically altering the Earth's cryosphere.

About Okjökull Glacier

- **Location and Characteristics**: Okjökull was a dome-shaped glacier situated around the summit of the Ok volcano, which is a 1,200-meter shield volcano located approximately 71 kilometers northwest of Reykjavík, Iceland. The glacier was a significant feature of the Icelandic landscape but has now completely melted due to the effects of rising global temperatures.

- **Death of the Glacier**: In 2014, Okjökull was officially declared "dead" after it had retreated so much that it could no longer be classified as a glacier. The disappearance of Okjökull was the first recorded instance of a glacier being declared dead as a result of human-caused climate change. The melting of glaciers like Okjökull serves as a visible marker of the profound impacts of global warming.

In 2023: Iceland's Iceberg Graveyard

- **Creation of Iceberg Graveyard**: In 2023, Iceland created the world's first iceberg graveyard, a symbolic memorial where headstones made of ice were constructed for 15 glaciers that are listed on the Global Glacier Casualty List. These glaciers are either completely dead or critically endangered due to climate change.

- **Global Glacier Casualty List**: The list includes glaciers from various regions around the world that have been significantly affected by warming temperatures. One of the notable glaciers on the list is the Anderson Glacier in Washington state, which in 2015 became the first glacier in the United States to be officially declared dead.

Do You Know?

- **International Year of Glaciers' Preservation**: In recognition of the growing threats to glaciers worldwide, the United Nations has designated 2025 as the International Year of Glaciers' Preservation. This initiative aims to raise awareness about the importance of glaciers and the urgent need to protect them from further harm caused by global warming.

- **World Day for Glaciers**: Starting in 2025, March 21st will be observed annually as World Day for Glaciers to highlight the importance of glacier conservation and encourage global efforts to slow down glacier retreat.

Earth’s Cryosphere

- **Definition of the Cryosphere**: The cryosphere refers to the parts of the Earth’s system that are composed of frozen water, including snow cover, glaciers, ice sheets, ice shelves, icebergs, sea ice, lake ice, river ice, permafrost, and solid precipitation. It is a critical component of the Earth’s climate system.

- **Role of Ice Sheets**: Ice sheets are massive bodies of ice that cover extensive areas of land, usually more than 50,000 square kilometers. There are currently two major ice sheets on Earth: the Greenland Ice Sheet and the Antarctic Ice Sheet. These ice sheets store the majority of Earth’s freshwater ice.

- **Thickness of Ice Sheets**: The ice sheets of Greenland and Antarctica are more than 2 kilometers thick, which significantly impacts global sea levels and the Earth’s climate system. The loss of ice from these regions has direct consequences on the global water cycle and sea levels.

Related Facts about the Cryosphere

- **70% of Earth’s Freshwater**: Approximately 70% of Earth’s freshwater is stored in the cryosphere, primarily in glaciers and ice caps. This makes glaciers essential sources of freshwater for ecosystems and human populations, especially in regions that rely on seasonal snowmelt for water.

- **Glaciers and Ice Sheets on Land**: Around 10% of the Earth’s land area is covered by glaciers or ice sheets, which are vital for maintaining the global water balance. The loss of these glaciers can significantly affect the availability of freshwater for millions of people worldwide.

Hindu Kush Himalaya (HKH) Region

- **Geography and Importance**: The Hindu Kush Himalaya (HKH) mountain range extends over 3,500 kilometers, passing through eight countries: Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Myanmar, and Pakistan. The region is often referred to as the "water towers of Asia" due to its critical role in supplying freshwater to the continent.

- **Origin of Major River Systems**: The HKH mountains are the sources of 10 major river systems, including the Amu Darya, Indus, Ganga, Brahmaputra, Irrawaddy, Salween, Mekong, Yangtse, Yellow River, and Tarim. These rivers provide water to nearly one-fourth of the world’s population, making the HKH region a vital water source for over 240 million people.

- **Hindu Kush Cryosphere Warming**: The cryosphere of the Hindu Kush Himalaya region is warming at twice the global average rate, according to the International Cryosphere Initiative. This accelerated warming increases the risk of glacial disasters, such as outburst floods, which can have catastrophic effects on downstream communities.

Roles and Significance of the Cryosphere

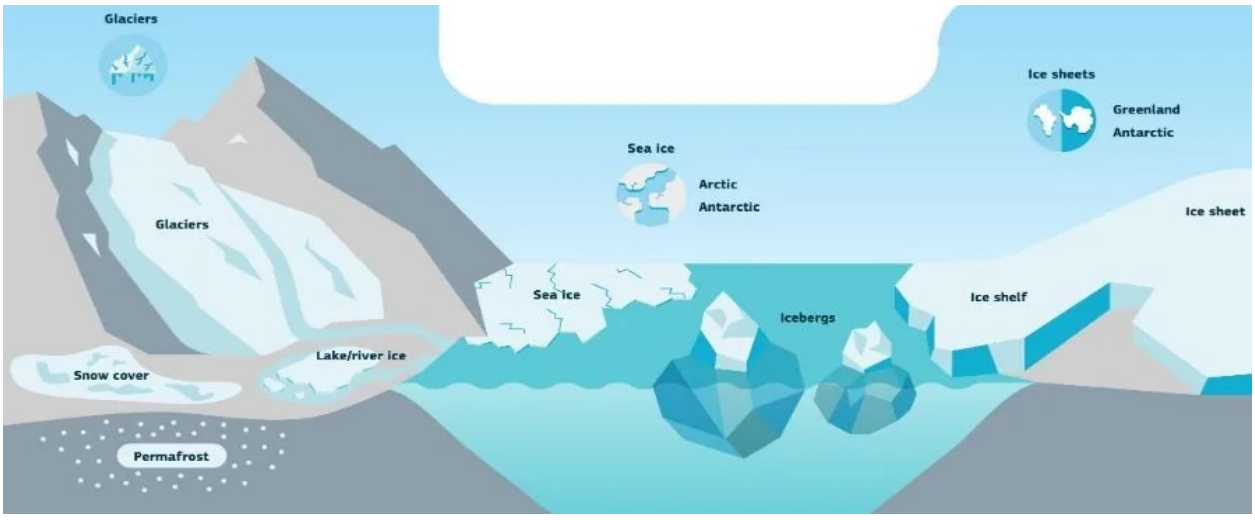
- **Climate Regulation**: The cryosphere helps regulate the Earth's climate by reflecting sunlight back into space. This is known as the albedo effect. Snow and ice have a high albedo, meaning they reflect a significant portion of incoming solar radiation, which helps cool the planet's surface. Without the cryosphere, the Earth would absorb more heat, leading to further warming.

- **Sea Level Control**: The cryosphere stores vast amounts of freshwater in glaciers and ice sheets. When these ice masses melt, they contribute to rising sea levels, which can lead to the flooding of coastal areas and the displacement of millions of people living in low-lying regions.

- **Global Water Cycle**: The cryosphere plays an essential role in the global water cycle by serving as a reservoir of freshwater. When glaciers and snow melt, they release water into rivers and lakes, which is used by ecosystems, agriculture, and communities. The timing of glacier melt is crucial for regions that depend on seasonal snowmelt.

- **Habitat for Specialized Species**: The cryosphere provides unique ecosystems for species that have adapted to cold, icy environments. These habitats are home to specialized organisms, such as polar bears, penguins, and seals, which rely on ice-covered regions for breeding, hunting, and migration.

- **Indicator of Climate Change**: The cryosphere is highly sensitive to temperature changes, and its retreat or expansion serves as a key indicator of global warming. As the cryosphere melts, it reveals the impacts of climate change on ecosystems and human communities, making it a valuable tool for climate scientists to monitor



environmental changes.

Threats to the Cryosphere and Global Impact

- **Global Warming**: Rising global temperatures due to human activities, such as burning fossil fuels and deforestation, are causing the widespread melting of glaciers,

ice caps, and sea ice. This accelerated melting contributes to rising sea levels and disrupts ecosystems that depend on ice-covered regions.

- **Rising Sea Levels**: The melting of ice in the cryosphere leads to an increase in ocean volume, contributing to rising sea levels. This threatens coastal communities and ecosystems, increasing the frequency and severity of flooding events.

- **Loss of Habitats**: As glaciers and ice sheets retreat, species that depend on ice-covered regions face habitat loss. Animals like polar bears, seals, and various marine birds rely on ice for hunting, breeding, and migration. The loss of ice habitats endangers these species and disrupts entire ecosystems.

- **Permafrost Thawing**: Permafrost is a layer of frozen soil that contains large amounts of carbon and methane, which have been trapped for thousands of years. As temperatures rise, permafrost is thawing, releasing these potent greenhouse gases into the atmosphere, which accelerates climate change.

- **Changing Snow Patterns**: The changing patterns of snowfall and melting due to climate change are disrupting ecosystems and water availability. Altered snowfall and melting can lead to droughts, floods, and reduced water availability, especially in regions that rely on glacial meltwater for drinking, agriculture, and hydropower.

Global Initiatives to Conserve the Cryosphere

- **Paris Agreement (2015)**: The Paris Agreement is a global treaty aimed at limiting the rise in global temperatures to well below 2°C, ideally to 1.5°C. This treaty emphasizes the need to reduce greenhouse gas emissions to protect the cryosphere and other ecosystems from the devastating impacts of climate change.

- **International Cryosphere Climate Initiative (ICCI)**: Established in 2009, the ICCI is a network of senior policy experts and researchers who collaborate with governments and organizations to create and implement strategies for preserving the cryosphere and mitigating the effects of climate change on icy regions.

- **IPCC Reports and Climate Action**: The Intergovernmental Panel on Climate Change (IPCC) produces regular reports on the state of climate change, including the effects on the cryosphere. The IPCC advocates for immediate climate action to slow the melting of glaciers and ice caps and prevent further environmental damage.

- **National Mission for Sustaining the Himalayan Ecosystem (NMSHE)**: This initiative, part of India's National Action Plan on Climate Change (NAPCC), aims to protect and sustain the Himalayan ecosystem, including glaciers, by implementing management and policy measures to mitigate climate change impacts.

- **CryoNet (WMO)**: The World Meteorological Organization's Cryosphere Observing Network (CryoNet) monitors and tracks changes in the cryosphere, providing essential data on the state of glaciers, ice sheets, and other frozen components of the Earth system.

- **Sustainable Development Goals (SDGs)**: The United Nations' SDGs, particularly Goal 13 (Climate Action) and Goal 15 (Life on Land), focus on reducing climate

change impacts on ecosystems, including the cryosphere. These goals aim to protect the environment and promote sustainable development.

- **The Arctic Council**: The Arctic Council is an intergovernmental forum for the eight Arctic nations to collaborate on issues related to environmental protection, sustainable development, and climate change mitigation in the Arctic region.

- **Global Ice Monitoring Initiatives**: Programs like the Global Cryosphere Watch (GCW) and the European Space Agency's CryoSat mission collect and analyze data on changes in the cryosphere, helping to monitor ice mass loss and its effects on global climate patterns.

Conclusion

- The cryosphere plays a critical role in regulating the Earth's climate, maintaining ecosystems, and providing freshwater resources. Protecting the cryosphere from further damage is essential to maintaining global climate stability and ensuring the availability of freshwater for future generations.

Source: **https://www.livescience.com/planet-earth/climate-change/1st-glacier-declared-dead-from-climate-change-seen-in-before-and-after-images-earth-from-space**