



GREENLAND LAKES: PLACES IN NEWS

Study Overview: 'Abrupt Transformation of West Greenland Lakes Following Compound Climate Extremes Associated with Atmospheric Rivers'

The study revealed that more than **7,500 lakes in western Greenland**, which were once crystal-clear and blue, have turned brown due to extreme climate events. This transformation has significant implications for the region's ecosystems, carbon cycle, and water quality.



Major Findings

1. Importance of West Greenland's Lakes:

West Greenland is home to tens of thousands of **blue lakes**, which serve as critical resources for local residents by providing **drinking water**. These lakes also play a vital role in **sequestering carbon** from the atmosphere, acting as natural carbon sinks that help mitigate climate change.



2. Abrupt Transformation:

In 2022, these lakes underwent a dramatic change, shifting from carbon sinks to **carbon sources**. This means they began emitting carbon dioxide into the atmosphere instead of absorbing it. Additionally, the **water quality** of these lakes deteriorated significantly.

3. Unprecedented Speed of Change:

Such transformations typically occur over **centuries** due to gradual environmental shifts. However, in this case, the changes happened within **just a few months**, highlighting the severity and rapidity of the climate extremes.



Reason for the Transformation

1. Unusual Weather Patterns in 2022:

Greenland usually experiences **snowfall** during the fall season, from late August to late September. However, in 2022, **warmer temperatures** caused the snow to turn into **rain**. This shift was driven by **atmospheric rivers**, which are narrow corridors of concentrated moisture in the atmosphere that can cause extreme rainfall events.

2. Thawing of Permafrost:

The heat from the warmer temperatures also caused the **permafrost** (frozen ground that contains large amounts of organic carbon) to thaw. This thawing released **carbon, iron, magnesium, and other elements** that had been trapped in the frozen ground for centuries.

3. Washing of Elements into Lakes:

The **record levels of rainfall** in 2022 washed these released elements into the lakes. The influx of carbon, iron, and other substances caused the lakes to turn **brown** and disrupted their ecological balance.



Impact of the Transformation

1. Shift from Carbon Sinks to Carbon Sources:

The lakes, which previously acted as **carbon sinks**, were transformed into significant **sources of carbon dioxide**. The study found that carbon emissions from these lakes increased by **350%**, contributing to the acceleration of climate change.

2. Decline in Water Quality:

The introduction of carbon, iron, and other elements into the lakes severely impacted their **water quality**. This decline has implications for the local communities that rely on these lakes for drinking water and other purposes.

3. Reduction in Light Penetration:

The browning of the lakes reduced the amount of **light** penetrating the water. This decrease in light affected the growth of **plankton**, which are microscopic organisms that form the base of the aquatic food web.

4. Impact on Biodiversity and Carbon Cycle:

The reduction in plankton biodiversity had **significant ramifications** for the region's **carbon cycle**. Plankton play a crucial role in absorbing carbon dioxide from the atmosphere, and their decline further exacerbates the release of carbon into the environment.

Conclusion

The study highlights how **compound climate extremes**, such as atmospheric rivers and unprecedented rainfall, can lead to rapid and dramatic environmental changes. The transformation of Greenland's lakes from blue to brown, their shift from carbon sinks to carbon sources, and the decline in water quality underscore the **far-reaching impacts of climate change**. These findings emphasize the urgent need for global action to mitigate climate change and protect vulnerable ecosystems.