Russia's aggression became the missing link to the scientists and researchers out there to solve the Global Climate Change

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The Arctic's rapid warming, outpacing global averages by two to four times, poses significant challenges for scientists tracking its transformation and impacts on the planet. With polar ice melting and permafrost thawing, researchers face formidable hurdles, including harsh conditions and now a dearth of data from Russian sources due to geopolitical tensions.

Arctic research stations form a crucial part of the region's monitoring network, with Russia contributing significantly, accounting for nearly half of the stations. However, following Russia's invasion of Ukraine, foreign scientists have been deprived of access to data from Russian field stations, resulting in the breakdown of global collaboration efforts with Russia.

A recent study published in Nature Climate Change underscores the critical role of Russian data in understanding Arctic changes.The halt in data transmission from

Russian Arctic research stations to the global scientific community is posing a significant challenge. This disruption, highlighted in a recent study, hampers scientists' ability to comprehend the swift changes occurring in the Arctic region. "Suddenly we don't have access to data from half of the landmass in the Arctic region. Our study reveals that the exclusion of the Russian stations severely decreases our ability to track Arctic changes," says lead author Dr. Efrén López-Blanco from Aarhus University.Author Efrén López-Blanco warns that excluding Russian data could lead to biases as significant as the anticipated effects of climate change by 2100.

Using Earth System Models, López-Blanco and his team have assessed the impact of the loss of Russian research stations on the

biases in various essential ecosystem variables related to Arctic change. Unsurprisingly, their findings indicate a significant impact.

Prior to the war, 21 Russian research stations actively contributed data to INTERACT, an international scientific collaboration among the eight Arctic nations. Many of these Russian

stations are located in the boreal forests of Siberia, in contrast to the majority of other stations in the consortium, which are based in Greenland, Svalbard, and Northern Canada.

"Half of the research stations in Russia are in the boreal zone. The boreal Forest uptakes a substantial amount of carbon, carbon that is accumulated as biomass and soil organic carbon. Siberia is therefore an important part of the arctic climate system. Leaving most of them out, it further increases our bias," says Dr. Efrén López-Blanco.

Echoing his sentiments, Professor Niels Martin Schmidt from Aarhus University underscores the consequences of omitting Russian data. "Excluding Russia from INTERACT impedes our ability to fully grasp Arctic change," he explains. "The vast taiga forest in Siberia, rich in biodiversity and carbon stores, is left out of the network, limiting our understanding of critical environmental shifts."

As tensions persist, the exclusion of Russian research stations raises concerns not only for scientific collaboration but also for the comprehensive understanding of Arctic

[One study discovered that over the last forty years, an immense amount of ice, exceeding 1,000 billion tons, has melted without proper documentation. The monitoring stations established by INTERACT in the Arctic play a crucial role in monitoring and understanding these alarming trends. Photo by: WWF]

climate dynamics. Experts urge for continued cooperation and inclusivity to address the complex challenges posed by climate change in the region.

To address bias in climate research, López-Blanco proposes enhancing existing infrastructure and establishing new research stations in northern Scandinavia and Canada. "Using our study's metrics, we can pinpoint locations with conditions similar to

those we're missing in Russia," he explains. "Identifying sites in Northern Canada or Scandinavia is feasible, but it requires significant funding and is up to agencies, policymakers, and decision-makers to pursue."

Analyzing data from 60 out of 94 International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT) sites, researchers found that gaps in knowledge persist even with all stations included. Approximately one-third of these selected stations were situated in Russia, with all being positioned above the 59 degrees north latitude line, just shy of Greenland's southern **extremity**. Notably, stations located on Greenland's ice sheet were omitted from the study due to their atypical terrestrial ecosystem.

López-Blanco emphasizes the critical impact of excluding Russian research stations: "The absence of ground-based knowledge from these stations represents a shift in baseline conditions as significant as the anticipated climate-induced changes by the end of the century."

Efrén López-Blanco warns that bias stemming from the conflict could hinder efforts to combat global climate change. He highlights that the loss of Russian research stations significantly impacts our ability to monitor global ecological changes such as permafrost degradation, vegetation shifts, and carbon emissions. "The war has compromised our capacity to track and detect climate changes," López-Blanco states. "This is crucial to consider as we strive to address and mitigate the effects of climate change worldwide."

According to Hiroyuki Enomoto, vice director-general of Japan's National Institute of Polar Research, the new study underscores that understanding the full impact of climate change in the Arctic is impossible without Russia's cooperation. Although the scientific community had long suspected this, Enomoto emphasizes that a "concrete analysis" confirming the necessity of collaboration is "highly desirable."

Kim Holmén, a climate and environment scientist at UiT the Arctic University of Norway, underscores the significance of a new study, stating that its rigorous findings signal a potentially dire trend for various Arctic research fields. Holmén emphasizes the broad impact, particularly on disciplines with less systematic data coverage or a reliance on Russian observations, such as marine biology, river ecosystems, and oceanography. He highlights the

indispensable role of social sciences and humanities in understanding human experiences in the Russian Arctic. Holmén stresses the necessity for comprehensive, long-term monitoring across all aspects of the Arctic environment, lamenting the loss of Russian data as a setback for global understanding and predictive capabilities regarding future changes.

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