Arctic heat waves linked to sea ice loss, new study reveals

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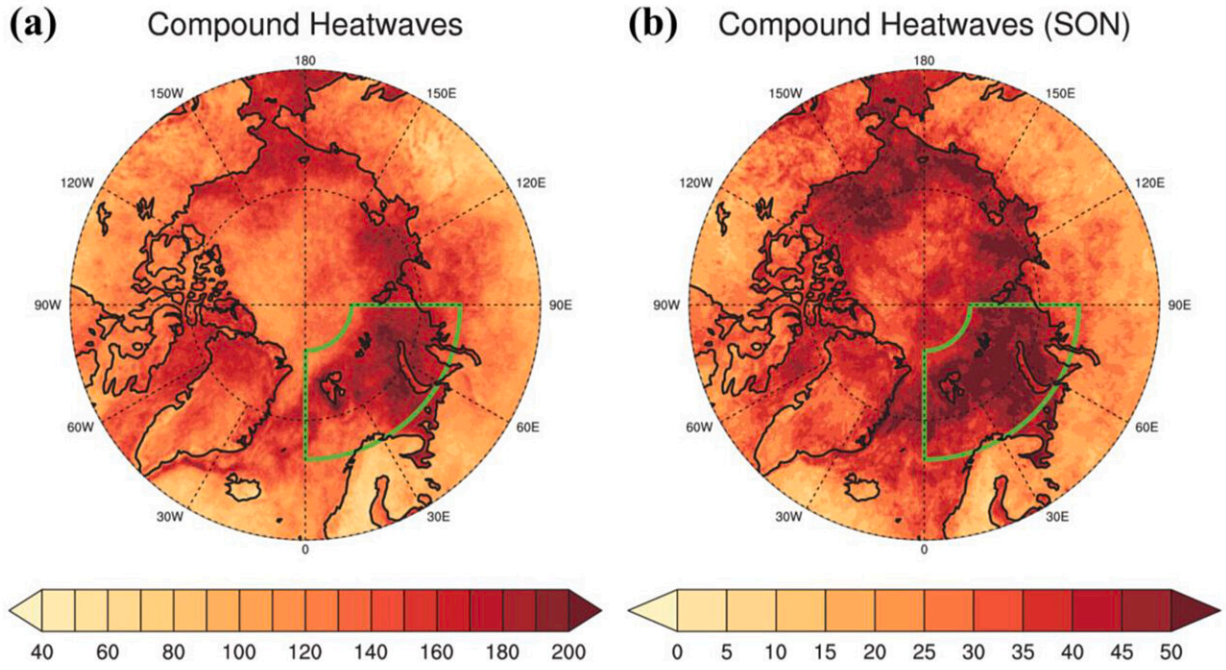

(a) Total number of compound daytime–nighttime heat wave events in the Arctic region (60–90° N) during the time period 1979–2021. (b) Total number of compound daytime–nighttime heat wave events in the Arctic region (60–90° N) during the boreal autumn season (September–October–November; SON) from 1979 to 2021. The green box represents the BKS region. Credit: *Weather and Climate Extremes* (2024). DOI: 10.1016/j.wace.2024.100712

Amid global warming, heat waves are striking even the Arctic, a region once considered immune to such extreme weather events. Recent

research reveals that these heat waves, particularly in the Barents-Kara Sea (BKS) during the boreal autumn, are not only increasing in frequency but are also impacting the climate far beyond the Arctic, from East Asia, to around the globe.

A study published in *Weather and Climate Extremes* delves into the mechanism of these autumn heat waves in the BKS and their connection to sea ice variability.

Researchers found that two days before these heat waves occur, a distinct atmospheric pattern emerges: a dipole mode featuring a negative anomaly over Greenland and a positive anomaly over the BKS.

"This dipole mode facilitates the continuous inflow of warm, moist air from the Atlantic into the BKS region," said Dr. Hu Wenting, the study's corresponding author and a researcher with the Institute of Atmospheric Physics at the Chinese Academy of Sciences.

The influx of warmth and moisture intensifies downward longwave radiation, as well as latent and sensible heat fluxes, driving up near-surface air temperatures and triggering these compound heat waves.

The study also highlighted that this increase in warmth and moisture drastically reduces sea ice concentration in the BKS region. This sea ice decline continues until at least one day after the heat wave, suggesting a feedback loop where higher temperatures may prolong the heat wave's impact.

These findings underscore the critical role of sea ice in regulating Arctic temperatures and hint at broader implications for global climate patterns as Arctic conditions continue to change.

More information: Yue Xin et al, Mechanism for compound daytime-

nighttime heatwaves in the Barents–Kara Sea during the boreal autumn and their relationship with sea ice variability, *Weather and Climate Extremes* (2024). DOI: 10.1016/j.wace.2024.100712

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