

EGU24-9554, updated on 19 Jan 2025

<https://doi.org/10.5194/egusphere-egu24-9554>

EGU General Assembly 2024

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Historical volcanic eruptions slowed down rapid decline in Arctic sea ice linked to global warming

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Arctic sea ice has experienced a differential decline in speed due to the same anthropogenic greenhouse gas forcing, as evidenced by rapid decline after the end of the last century. Our convergent observations, last-millennium reanalysis, and model analyses have revealed that large tropical volcanic eruptions can lead to a decadal increase in Arctic sea ice, and the 1982 and 1991 large volcanic eruptions slowed down the decline of Arctic sea ice during the last century. The models, selected based on the observed sensitivity of Arctic sea ice to volcanic eruptions, suggest that the earliest ice-free summer year in the Arctic will be around 2040 in high-emission sceneria of SSP585. These findings emphasized the crucial need to incorporate volcanic influences when projecting future Arctic changes amid global warming.