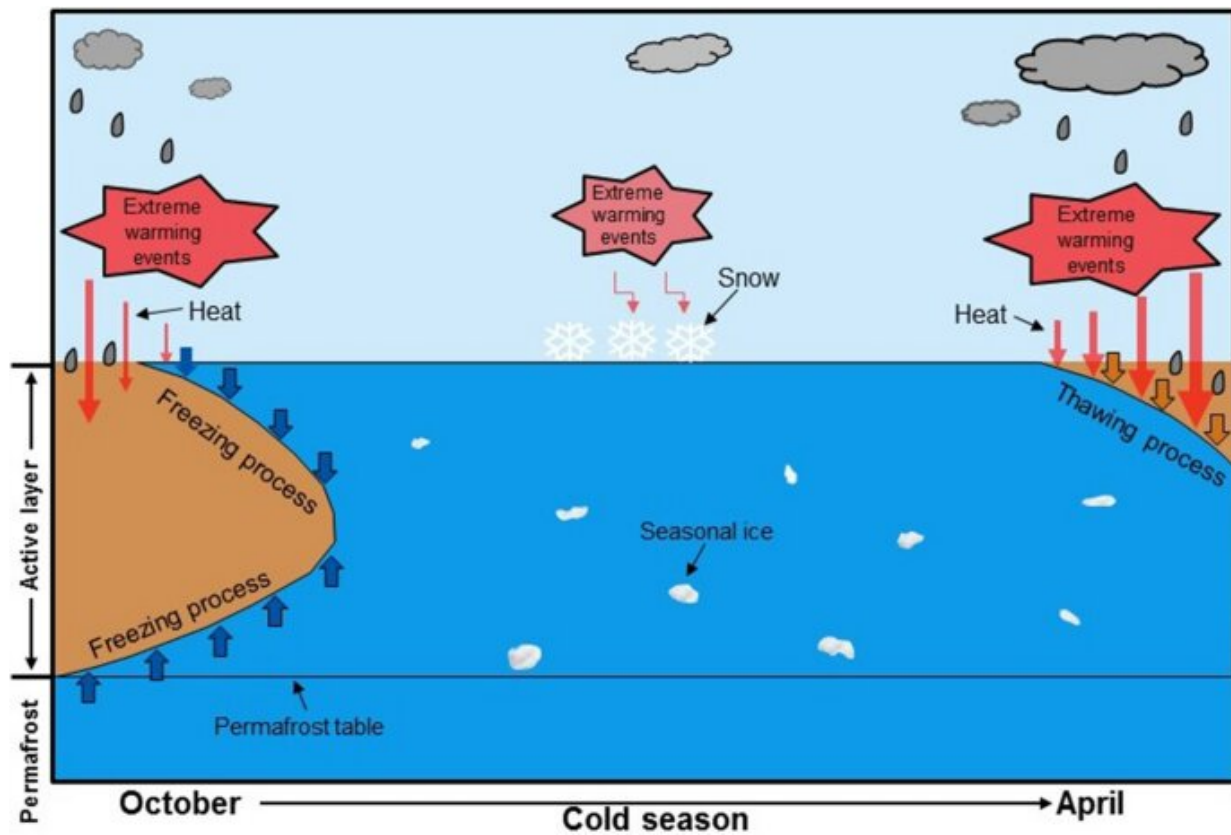


Effects of extreme warming events on permafrost hydrothermal processes

March 23 2022, by Li Yuan



Graphical abstract. Credit: *Climate Dynamics* (2022). DOI: 10.1007/s00382-022-06155-x

Permafrost degradation has been confirmed in high-altitude and high-latitude regions during past decades. Long-term warming processes can

greatly affect permafrost changes. Notably, the transient extreme warming events can also exert strong effects on permafrost environments.

Recently, a research team led by Prof. Wu Tonghua from the Northwest Institute of Eco-Environment and Resources of the Chinese Academy of Sciences and their collaborators investigated variations in extreme warming events and their impacts on the hydrothermal regimes of the active layer in three [permafrost](#) regions in China. They used $0.5^{\circ} \times 0.5^{\circ}$ gridded meteorological dataset and observational [soil](#) hydrothermal data during the investigation.

Related findings were published in *Climate Dynamics*.

The researchers found that extreme warming events with different types showed statistically significant increasing trends with different rates from 1962 to 2019. Most recorded high-intensity extreme warming events occurred primarily in recent 15 years.

They analyzed the relative variation ratio of soil temperature and [soil moisture](#) at different depths from 2006 to 2015 at the Tanggula permafrost monitoring site. "The occurrence times of extreme events and the active layer freeze-thaw process codetermined the influential extents of the extreme events on the active layer hydrothermal conditions.," said Prof. Wu.

In particular, extreme warming events that occurred from March to April could cause soil temperature to increase with a greater magnitude than that induced by events occurring from October to November.

This study will help to better understand the influences of extreme [warming](#) events on the hydrothermal conditions of the active layer in permafrost regions and provide useful references to improve permafrost

models from the perspective of extreme events.

More information: Xiaofan Zhu et al, Increased extreme warming events and the differences in the observed hydrothermal responses of the active layer to these events in China's permafrost regions, *Climate Dynamics* (2022). [DOI: 10.1007/s00382-022-06155-x](https://doi.org/10.1007/s00382-022-06155-x)

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