

Infrared heater arrays help to simulate ecosystem-scale forest soil warming

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Under global warming, the rising temperature will exert profound impacts on forest ecosystems. How forest ecosystems respond to climate warming will determine forest trajectories over the next 100 years.

However, due to the lack of long-term and large-size field warming experiments in forests, the potential responses of [forest ecosystems](#) to rising temperature remain unclear.

Recently, in a field warming experiment in a temperate forest, scientists led by Prof. Fang Yunting from the Institute of Applied Ecology, Chinese Academy of Sciences, are evaluating the response of the existing biological communities to warming levels from ambient to +2°C, which is provided by large-scale infrared (IR) heater arrays.

This ecosystem-scale warming experiment is conducted in Qingyuan Forest, Northeast China. The primary goal of the warming experiment is to examine how and through what mechanisms tree growth and [soil carbon](#) cycling respond to warming.

In the first four years (2018–2021), the IR heater arrays were capable of providing constant temperature elevation in the surface mineral soils over the large-scale plots (108 m²). Subsoils down to 60 cm were also warmed 1.2 to 2°C. As for [soil moisture](#), the IR warming did not significantly affect it either in surface soils or in subsoils.

Most importantly, the IR heater array overcomes complex field conditions, such as [heavy rains](#) and snow, which demonstrates its feasibility for soil warming in tall-statured forest ecosystems.

This ongoing, long-term warming experiment can help us to see how the temperate forest responds to warming level predicted in the next several decades. Moreover, this forest warming site offers opportunities for collaborations across broad research interests, including soil fauna and plant feedback on future climatic conditions.

The study was published in *Methods in Ecology and Evolution*.

More information: Yihang Duan et al, Design and performance of an ecosystem-scale forest soil warming experiment with infrared heater arrays, *Methods in Ecology and Evolution* (2022). [DOI: 10.1111/2041-210X.13932](https://doi.org/10.1111/2041-210X.13932)

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