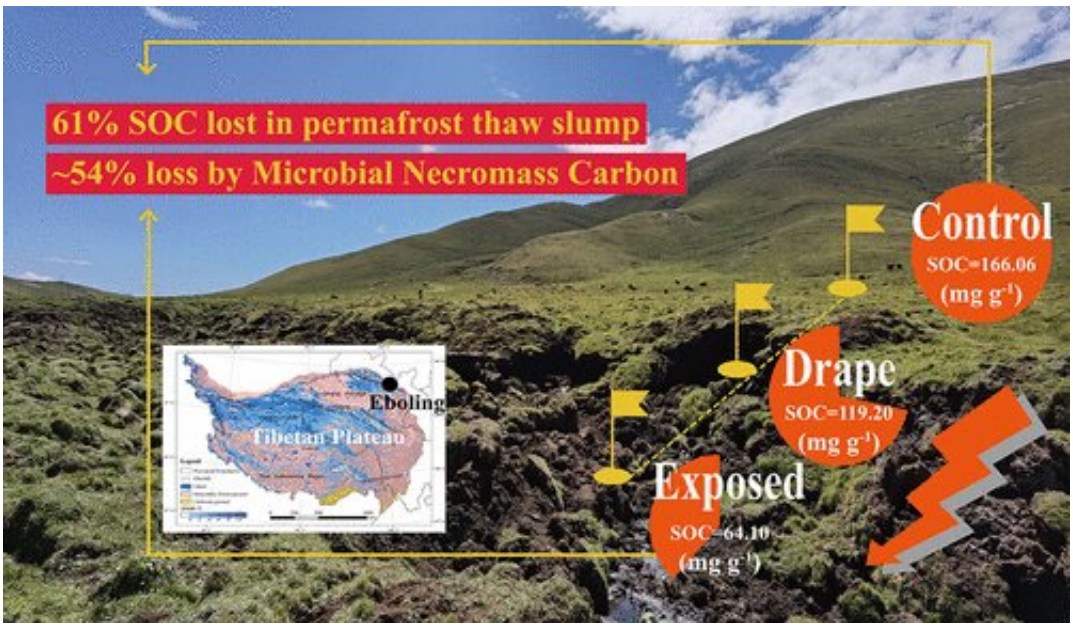
Microbial necromass carbon causes dramatic carbon loss in permafrost thaw slump of Tibetan Plateau

April 26 2023, by Li Yuan



Credit: *Environmental Science & Technology* (2023). DOI: 10.1021/acs.est.2c07274

Permafrost in the Tibetan Plateau contains a large amount of soil organic carbon (SOC). Climate change leads to rapid permafrost degradation and thermal collapse, which can change the microgeomorphology and soil physical and chemical properties.

Previous studies have proved that thermal collapse causes the loss of the

soil carbon pool, but the composition and characteristics of lost organic carbon are not well understood.

A joint research team led by Prof. Kang Shichang from the Northwest Institute of Eco-Environment and Resources of the Chinese Academy of Sciences (CAS) collected soil samples in the northeastern Tibetan Plateau to study variations of different organic carbon components (from microorganisms and plants) and their controlling factors during thaw slump. They used amino sugars and lignin phenols to represent the relative abundance of microbial necromass and plant lignin in soil.

The study was published in *Environmental Science &Technology* on April 19.

They found that the retrogressive thaw slump caused 61% loss of SOC, and the microbial necromass carbon accounted for 54% of the SOC loss in the permafrost thaw slump.

In addition, changes of amino sugars were mainly related to the soil moisture content, pH and plant input, while changes of lignin phenols were mainly related to soil moisture and bulk density.

This study reveals the differences of organic carbon loss from different sources caused by thaw slump and its controlling factors, which deepens our understanding of the process and mechanism of carbon loss caused by rapid permafrost degradation.

More information: Wenting Zhou et al, Dramatic Carbon Loss in a Permafrost Thaw Slump in the Tibetan Plateau is Dominated by the Loss of Microbial Necromass Carbon, *Environmental Science & Technology* (2023). DOI: 10.1021/acs.est.2c07274