



## **Hotspots, vulnerable ecosystems and global change of fire-influenced permafrost degradation**

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Fire is a process which contributes to the degradation of permafrost in the boreal and arctic zones. The resilience of permafrost against degradation depends mainly on ecosystem properties such as the thickness and type of the organic layer. Thus, fire-influenced permafrost degradation is mainly controlled by ecosystem properties. On the basis of earth observation data and a global vegetation-fire-permafrost model, this study deduces global hotspots of fire-influenced permafrost degradation, assesses which ecosystems are mostly vulnerable and how this vulnerability will develop under climate and associated vegetation change. The recent contribution of fires to permafrost degradation in the high Arctic tundra is uncertain. The future vulnerability depends on the expansion rate of deciduous forests. Under recent and future climatic conditions summergreen needle-leaved forests in eastern Siberia are mostly affected by fire-influenced permafrost degradation, where fires accelerate the climatic risk to permafrost degradation and could contribute to a boreal forest dieback. In needle-leaved evergreen forests of the southernmost boreal regions permafrost is mainly vulnerable to climate warming but fires contribute to final permafrost degradation and support the conversion of forests to steppes under climate change.