



Permafrost Infrastructure

7A - Permafrost Railways

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Railways built over permafrost terrain are vulnerable to damage arising from ground warming and thaw. They are particularly sensitive to ground subsidence, frost-jacking of piles, and other permafrost processes causing rail bed deformation and negatively impacting rail geometry. Differential settlement and heaving at transition sections (e.g. between road and bridge, excavation and filling, or tunnel and subgrade) are an important cause of railway damage. Additionally, the management of water and prevention of washouts near permafrost railways is complicated by the nature of permafrost hydrology and by warming effects of water accumulation near the embankment foot.

Several mitigation methods can be used to alleviate the impacts of permafrost on railways, including adapted railbed design and improved monitoring and detection of incipient rail deformation. To be effective, these methods should be paired with effective characterization of permafrost distribution and ground-ice content, study of temperature-dependent geotechnical properties, and modelling of expected permafrost and ground surface response to climatic change.

This interdisciplinary session is focused on the characterization, prediction, management, and mitigation of permafrost-related hazards affecting railways in permafrost regions and welcomes research, data, and perspectives from all fields and sectors that aim to increase the resilience of permafrost railways to climatic warming.

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