



# SBGf Conference

18-20 NOV | Rio'25

**Sustainable Geophysics at the Service of Society**

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**Submission code: JA57NBPDA9**

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## **Collapse of a frozen granular column due to thawing**

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**Title:**

Collapse of a frozen granular column due to thawing

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**Abstract:**

Permafrost, which covers approximately one-fifth of the Earth's land surface, plays a key role in shaping cold-region landscapes. Under the influence of global warming, permafrost is thawing rapidly, leading to reduction in soil cohesion and an increased susceptibility of hill-slopes to landslides. In this context, we experimentally investigate the stability and collapse of a thawing column of frozen granular material. The experiment consists in mixing monodisperse glass beads with a controlled amount of water, freezing the mixture, and then letting it thaw. We systematically vary the water content, bead size, and column dimensions. Our work allows us to propose a scaling law that predicts the stability of this complex system and to highlight the critical roles of wet granular cohesion and thawing process in the collapse dynamics.