

## **Crevasse detection in glaciers of southern Chile and Antarctica by means of ground penetrating radar**

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**Abstract** Detection of crevasses is critical for safe travelling on glaciers. Here we present the use of a Ground Penetrating Radar (GPR) for crevasse detection. Experiments were made in temperate ice on Glacier Mocho, Volcán Mocho-Choshuenco, southern Chile (39°25'S) and in cold ice in East Antarctica (87°30'S). In southern Chile the radar was hand-carried 1.2 m in front of the operator who was walking over the glacier at a speed of  $\sim 0.5 \text{ m s}^{-1}$ , while in Antarctica it was mounted on a 7-m long rod in front of a tractor convoy travelling at a speed of  $\sim 2 \text{ m s}^{-1}$ . In both geographical sites profiles were made perpendicularly to crevasses ranging in width from 0.1 m to 1.0 m. Buried crevasses clearly show as apexes of diffraction hyperbolae, which could be detected down to a depth of 15 m. They show as discontinuities in the firm stratigraphy which have a width equal to the crevasse width, and associated diffraction hyperbolae to each side of the crevasse. The GPR proved to be a valuable tool for detecting crevasses, allowing for a reaction time of  $\sim 9 \text{ s}$  (equivalent to  $\sim 4.5 \text{ m}$  on the ground) in the case of the hand-carried system and  $\sim 5 \text{ s}$  (or  $\sim 10 \text{ m}$  on the ground) for the tractor system.

**Key words** Antarctica; crevasses; GPR; southern Chile; temperate ice

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