

Singh, S.K., Rathore, B.P., Bahuguna, I.M., Ramnathan, A.L. and Ajai, 2012, Estimation of Glacier Ice Thickness using Ground Penetrating Radar in the Himalayan region, Current Science, 103 (1), pp 68-73.

Abstract:

Glacier ice thickness estimation can provide vital information for the estimation of glacier-stored freshwater resources and numerous field-based techniques have been used for this. Determination of ice thickness is a challenging task in mountain glaciers like in the Himalayas, due to harsh climate and rugged terrain conditions. In the present study, Ground Penetrating Radar (GPR) survey was carried out to estimate the ice thickness at Chhota Shigri glacier in Himachal Pradesh, India. This GPR carries a multiple low frequency antenna. GPR surveying was done in discrete mode at 16 MHz frequency with 4 m antenna gap (transmitter and receiver) at 50 cm data-acquisition intervals along the glacier length at bare ice of the ablation zone. The bedrock reflection was distinctly observed in the profiles indicating ice thickness varying from 110 to 150 m with approximately 0.049 km³ water equivalent for the surveyed area. The results also showed subsurface features like point reflector and a linear non-bed reflection within the ablation ice zone. Total volume of ice and water equivalent of Chhota Shigri glacier was found to be 1.20 and 1.05 km³ respectively, using area–depth relationship for the Himalayan glaciers.