Application of refraction seismics in alpine permafrost studies: A review

D. Draebing

PII: S0012-8252(16)30041-1
DOI: doi: 10.1016/j.earscirev.2016.02.006
Reference: EARTH 2231

To appear in: *Earth Science Reviews*

Received date: 5 October 2015
Revised date: 27 January 2016
Accepted date: 22 February 2016

Please cite this article as: Draebing, D., Application of refraction seismics in alpine permafrost studies: A review, *Earth Science Reviews* (2016), doi: 10.1016/j.earscirev.2016.02.006

Application of refraction seismics in alpine permafrost studies: A review.

D. Draebing

currently: Bonn, Germany; former: Technische Universität München, Monitoring, Chair of Landslide Research, Arcisstr. 21, 80333 München, Germany

E-mail address: daniel.draebing@gmx.de

Abstract

Refraction seismics is a common geophysical application to investigate permafrost in alpine studies. This study reviews the physical basis of the use of refractions seismics and introduces the history of its application in alpine environments. Seismic properties are influenced by rock or soil properties and fluid or ice effects. In laboratory measurements, these influences are determined and linked to mechanical properties or used for calibration of field studies. In field conditions, supplementary environmental factors influence the seismic properties of landforms. In this paper, laboratory studies of rocks from different lithologies and with different properties as well as case studies on rock glaciers, moraines, talus slopes and debris-covered slopes are collected and influencing factors quantitatively analyzed. The data demonstrate how lithology, porosity and anisotropy influence p-wave velocity. Environmental factors result in a high variation of p-wave velocities in landforms, however, p-wave velocities enable the differentiation of active-layer and permafrost in rock glaciers and moraines. In talus slopes and debris-covered slopes, p-wave velocity contrasts between active-layer and permafrost layer might be insufficient and require the application of additional methods for a final differentiation.