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# **Annals of Glaciology 60(79)**

Progress in Cryoseismology



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# Annals of Glaciology

Progress in Cryoseismology



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## PREFACE

This special issue of the *Annals of Glaciology* focuses on seismic measurements related to glaciers and ice sheets. This field, often referred to as “cryoseismology” is a relatively new earth science discipline, as modern instrumentation and technology have only recently tackled challenges of sensor deployment in rugged alpine terrain - including glacial ice. Cryoseismology has been attracting glaciologist’s interest, because seismic signals carry important information about ice deformation and structure. Seismic sources reflect in-situ stresses, englacial and subglacial hydraulic processes and other conditions in a glacial environment. Moreover, as seismic waves propagate through the glacial body, they are altered according to ice structure such as fracture state and fabric. For these reasons, seismic signals related to glaciers and ice sheets provide valuable and sometimes unique insights into our planet’s cryosphere.

The majority of this issue’s contributions is centered on the interpretation of passive recordings. Depending on the density and size of the recording seismic networks, signal interpretation ranges between single-station methods and seismic network and array techniques providing additional source constraints such as locations and rupture models. A number of findings are reported documenting thermal and ice dynamic controls on englacial fracturing in various glacial settings, including ice shelves.

Another group of papers uses seismic waves to constrain properties of the glacial medium through which they propagate. This includes the more traditional approach of interpreting seismic waves generated by active sources as well as studies of seismic signals from passive recordings. For the latter, naturally occurring seismic sources are used including surface crevasse icequakes and seismic background noise. While processing of passive earthquake recordings and seismic noise to elucidate subsurface structures has revolutionized crustal seismology in the past 1-2 decades, cryoseismology has yet to master these techniques. Several papers in this special issue push in this direction.

Finally, a set of papers studies subglacial sources in Alpine and Polar environments. Conditions and processes at the ice bed are still largely masked from measurements with sufficient temporal and spatial resolution and seismology may hold the key to important discoveries affecting our understanding of ice flow and ice sheet dynamics. For example, accumulating seismic evidence shows that glacier sliding via sudden stick–slip episodes is more widespread than previously thought. We should not be surprised to see more basal processes revealed via seismic techniques.

*Annals of Glaciology* is a peer-reviewed thematic journal published by Cambridge University Press on behalf of the International Glaciological Society. A team of 10 Scientific Editors with wide expertise were responsible for assessing the papers in this issue. They acknowledge and are grateful for the work of a large number of peer-reviewers for their critical assessments and efforts to improve the manuscripts.

**Fabian Walter**

# CONTENTS

Louis Garcia, Karen Luttrell, Debi Kilb, Fabian Walter	Joint geodetic and seismic analysis of surface crevassing near a seasonal glacier-dammed lake at Gornergletscher, Switzerland	1
Samuel Taylor-Offord, Huw Horgan, John Townend, J. Paul Winberry	Seismic observations of crevasse growth following rain-induced glacier acceleration, Haupapa/Tasman Glacier, New Zealand	14
Andreas Köhler, Valerie Maupin, Christopher Nuth, Ward Van Pelt	Characterization of seasonal glacial seismicity from a single-station on-ice record at Høltedahlfonna, Svalbard	23
Jade Cooley, Paul Winberry, Michelle Koutnik, Howard Conway	Tidal and spatial variability of flow speed and seismicity near the grounding zone of Beardmore Glacier, Antarctica	37
Denis Lombardi, Irina Gorodetskaya, Guilhem Barruol, Thierry Camelbeeck	Thermally induced icequakes detected on blue ice areas of the East Antarctic ice sheet	45
Masahiro Minowa, Evgeny A. Podolskiy, Shin Sugiyama	Tide-modulated ice motion and seismicity of a floating glacier tongue in East Antarctica	57
Yuri V. Konovalov	Ice-shelf vibrations modeled by a full 3-D elastic model	68
Amandine Sergeant, Anne Mangeney, Vladislav A. Yastrebov, Fabian Walter, Jean-Paul Montagner, Olivier Castelnau, Eléonore Stutzmann, Pauline Bonnet, Velotioana Jean-Luc Ralaiarisoa, Suzanne Bevan, Adrian Luckman	Monitoring Greenland ice sheet buoyancy-driven calving discharge using glacial earthquakes	75
Fabian Lindner, Gabi Laske, Fabian Walter, Adrian K. Doran	Crevasse-induced Rayleigh-wave azimuthal anisotropy on Glacier de la Plaine Morte, Switzerland	96
Lukas E. Preiswerk, Clotaire Michel, Fabian Walter, Donat Fäh	Effects of geometry on the seismic wavefield of Alpine glaciers	112
Tao Zhang, Yuqiao Chen, Min Ding, Zhongyan Shen, Yuande Yang, Qingsheng Guan	Air-temperature control on diurnal variations in microseismicity at Laohugou Glacier No. 12, Qilian Mountains	125
Douglas R. Macayeal, Alison F. Banwell, Emile A. Okal, Jinqiao Lin, Ian C. Willis, Becky Goodsell, Grant J. Macdonald	Diurnal seismicity cycle linked to subsurface melting on an ice shelf	137
Dominik Gräff, Fabian Walter, Bradley P. Lipovsky	Crack wave resonances within the basal water layer	158

Thomas S. Hudson, Jonathan Smith, Alex M. Brisbourne, Robert S. White	Automated detection of basal icequakes and discrimination from surface crevassing	167
Bradley Paul Lipovsky, Colin R. Meyer, Lucas K. Zoet, Christine Mccarthy, Dougal D. Hansen, Alan W. Rempel, Florent Gimbert	Glacier sliding, seismicity and sediment entrainment	182
Gregory Church, Andreas Bauder, Melchior Grab, Lasse Rabenstein, Satyan Singh, Hansruedi Maurer	Detecting and characterising an englacial conduit network within a temperate swiss glacier using active seismic, ground penetrating radar and borehole analysis	193
Siobhan F. Killingbeck, Adam D. Booth, Philip W. Livermore, Landis J. West, Benedict T. I. Reinardy, Atle Nesje	Subglacial sediment distribution from constrained seismic inversion, using MuLTI software: examples from Midtdalsbreen, Norway	206
Rebecca Schlegel, Anja Diez, Henning Löwe, Christoph Mayer, Astrid Lambrecht, Johannes Freitag, Heinrich Miller, Coen Hofstede, Olaf Eisen	Comparison of elastic moduli from seismic diving-wave and ice-core microstructure analysis in Antarctic polar firn	220
Joshua D Carmichael	Narrowband signals recorded near a moulin that are not moulin tremor: a cautionary short note	231