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Engineering Geology for Society and Territory – Volume 7

Education, Professional Ethics and
Public Recognition of Engineering Geology



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Cover Illustration: San Felice sul Panaro, Modena, northern Italy. The San Felice Vescovo Church, built 1499, was completely destroyed by an earthquake, which struck a vast area of the Po Plain on 20 May 2014. As visible, many near ancient buildings did not suffer similar damages. This proves that the effect of the seismic shock is strongly dependent also from structural features of the building. *Photo:* Giovanni Bertolini.

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Jerry Brown and Julia Stanilovskaya

Abstract

The First International Conference on Permafrost was held at Purdue University, School of Civil Engineering, West Lafayette, Indiana, United States, on 11–15 November 1963. Some 285 registered engineers, researchers, manufacturers and builders participated representing Argentina, Austria, Canada, Germany, Great Britain, Japan, Norway, Poland, Sweden, Switzerland, the USA and the USSR. This was the first post-World War II major contact with a group of senior Soviet frozen ground researchers. The Proceedings is considered to be the first multi-national, English-language collection of papers devoted entirely to permafrost topics. Since 1963, nine additional international conferences have been held: two more in the United States (Fairbanks 1983, 2008), two in the Soviet Union and Russia (Yakutsk 1973, Salekhard 2012), two in Canada (Edmonton 1978, Yellow-knife 1998), and one in Trondheim, Norway (1988), Beijing, China (1993), and Zurich, Switzerland (2003). The International Permafrost Association (IPA) was formed in 1983 and subsequent conferences were under the IPA auspices. A brief review of these 10 conferences is presented. Discussions between IAEG and IPA took place by correspondence and at a meeting in Vail, Colorado, in June 2007 where it was decided to initiate a commission on engineering geology in permafrost regions.

Keywords

Conference on permafrost • 50th anniversary • International permafrost association

49.1 First International Conference on Permafrost

The year 2013 marked the 50th anniversary of the First International Conference on Permafrost (ICOP), held at Purdue University's School of Civil Engineering in West Lafayette, Indiana, United States, 11–15 November 1963

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(Woods and Leonard 1964). The conference was an historic event in that it brought together, for the first time, leading researchers and practitioners from North America and other countries with diverse interests and activities in the study and applications of perennially frozen ground, cold regions engineering, and related laboratory investigations. The 285 registered participants represented engineers, researchers, manufacturers and builders from the USA (231), Canada (42), the USSR (5), Sweden (3) and Argentina, Austria, Great Britain, Japan, Norway, Poland, Switzerland, and West Germany. This report is based, in part, on a paper published in 2013 (Brown 2013).

The conference was organized by the Building Research Advisory Board of the U.S. National Academy of Sciences–National Research Council (NAS-NRC). The carefully edited Proceedings, published in 1966 by the NAS (NAS

Table 49.1 Summary statistics for the ten international conferences on permafrost and publications

Conference	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth	Tenth
Year	1963	1973	1978	1983	1988	1993	1998	2003	2008	2012
Location	USA	USSR	Canada	USA	Norway	China	Canada	Switzerland	USA	Russia
Registrants	285	400	452	851	305	275	268	296	685	550
Countries represented	9	16	13	24	19	21	25	24	33	24
Plenary sessions	All	All	8	6	8	3	2	6	5	7
Proceedings volumes	1	2	2	2	3	2	1	2	2	5
Pages	563	1,649	1,202	1,937	1,620	1,360	1,276	1,322	1,740	683
Papers	104	87	147	276	289	189	188	230	358	194
Abstract volume(s)	1	1	1		1	1	1	2	2	2
Extended abstracts	–	–	–	–	–	–	–	96	187	374

1966), is considered to be the first multi-national, English-language collection of papers devoted entirely to permafrost topics. In addition, the Soviets prepared a special book containing 26 papers organized into nine topical themes.

The closing session included summary reports by the panel moderators. These reports and discussions, published in the Proceedings, reflected the relevant issues of that period. Many of these are pertinent today and are recommended reading for students, young researchers, and established professionals. Although the original printed Proceedings volume may no longer be readily available for purchase, it is accessible in many university and government libraries and it is obtainable via the ICOP DVD (IARC 2008), and on several permafrost and other web sites.

49.2 Subsequent International Conferences on Permafrost

The first conference's resolutions recommended that a second international conference be planned and held with the objectives of further interdisciplinary support and participation. The Purdue conference essentially broke the "ice" between East and West permafrost researchers and set the stage for the Second ICOP. That conference, organized by Melnikov (Director of the Permafrost Institute in Yakutsk), was convened in 1973 and represented the first large international conference held in this restricted area of Siberia, and followed a smaller conference in 1969 (Brown 2012). These accomplishments were the result of Academician Melnikov vision and leadership.

All subsequent permafrost conferences maintained the interdisciplinary principles set forth at the Purdue meeting, and had both plenary and special thematic sessions, but the review papers were not always published in the conference Proceedings. These conferences included two more in the

United States (Fairbanks 1983, 2008), two in Canada (Edmonton 1978, Yellowknife 1998), one each in Trondheim, Norway (1988), Beijing, China (1993), and Zurich, Switzerland (2003), and a second conference in Russia (Salekhard 2012) (Table 49.1). Following the formation of the International Permafrost Association (IPA) at the 1983 ICOP, subsequent conferences were organized and administered under the auspices of the IPA. A review of the first eight conferences is available (Brown and Walker 2007) and in a Ninth ICOP (NICOP) brochure published in celebration of the 25th anniversary of IPA and commemoration of the Fourth International Polar Year (Walker and Brown 2008). Starting with the NICOP conference, the Permafrost Young Researchers Network (PYRN) participated in conference activities.

49.3 Publications of International Conferences on Permafrost

Because plenary papers and thematic reviews hold special importance as temporal benchmarks illustrating the state of the science at the time of their appearance, it is worth reviewing approaches employed for each conference and the corresponding topics. Table 49.2 contains a summary of the actual topics presented in plenary, special or topical sessions for all ten conferences. Several topics reoccur in a number of conferences such as ground ice, thermal conditions, mountain permafrost, and select engineering topics including pipelines and other linear construction. More recently reviews related to coastal, subsea and mountain permafrost, carbon, climate change, planetary and Southern Hemisphere permafrost were presented and published. The topic of ground ice remains relevant in discussions of climate change, thermokarst and carbon content of permafrost terrains. For NICOP a special issue of the journal

Table 49.2 Summary of conference topics for plenary, special and/or theme sessions

First (1963-USA)	Second (1973-USSR)	Third (1978-Canada)	Fourth (1983-USA)	Fifth (1988-Norway)	Sixth (1993-China)
<i>Plenary sessions</i>	<i>Topical sessions</i>	<i>Theme papers</i>	<i>Panel sessions</i>	<i>Special session</i>	<i>Special session</i>
North America permafrost	<i>North Amer. reviews</i>	Ground ice	Foundations/embankments	Temperature/climate	Changing climate
Permafrost problems	Thermal	Hydrogeology E. Siberia	Heave/ice segregation	Climate change	Human changes
Soils/vegetation	Distribution	Vegetation/revegetation	Subsea permafrost	Svalbard	Degradation QTH
Ground ice	Ground ice	Disturbance/protection	Pipelines	Coasts North America	Periglacial/mountain
Geomorphology	Physics/mechanics	Geophysics	Environmental protection	Coastal processes	Mountains North America
Phase change	Groundwater	Structures	Climate/geothermal	Railway Canada	Mountains Europe
Thermal aspects	Mapping	Dams		Airfields Alaska	Mountains Asia
Physico-mechanical	Construction	Alyeska pipeline		Yamal development	Linear construction
Exploration					Frost damage China
Sanitary/hydraulic	Soviet reviews				
Earthwork/foundations					
Seventh (1998-Canada)	Eighth (2003-Switzerland)	Ninth (2008-USA)	Tenth (2012-Russia)		
<i>Plenary lectures</i>	<i>Plenary lectures</i>	<i>Plenary sessions</i>	(Ninth plenary cont'd)	<i>Plenary lectures</i>	
Field investigations NA	Lowlands permafrost	<i>Living in Alaska</i>	<i>Processes</i>	Carbon budget	
Geothermal/engineering	Mountain permafrost	Climate simulations	Hydrology	Engineering guidelines	
Living with frozen ground	Ice age permafrost	Thermal state	Trace gas budget	Coastal/subsea	
	Subsea permafrost	TAPS design	Heat-water transfer	Engineering advances	
	Southern hemisphere	Thermokarst	Subglacial freezing	Map Russia	
	Planetary/astrobiology	<i>Thermal state</i>	<i>Washburn tribute</i>	Mountain permafrost	
		Russia	Antarctic periglacial	Thermokarst	
	<i>Plenary Reviews (12)</i>	Europe	Alpine perspective	Monitoring (Norway)	
	Exploraton (2)	Active layer	Polar periglacial	Antarctic	
	Interactions (2)	Central Asia	Mass movement		
	Properties	<i>Engineering</i>			
	Infrastructure (3)	Design			
	Slopes	Geotechnics			
	Modelling	Russian approaches			
	Warming	Qinghai-Tibet railway			
	Monitoring				

Permafrost and Periglacial Processes was available at the conference and contained seven review papers (Lewkowicz 2008), in addition to the 17 plenary papers published in the Proceedings.

Throughout the 50-year history of the International Conferences on Permafrost, publication of Proceedings has been the major legacy of each conference. Over the course of the 50 years more than 2,000 papers in English were published in the ICOP Proceedings, involving the efforts of many hundreds of reviewers (Table 49.1). Beginning with the Eighth ICOP, a second form of publication was initiated involving Extended Abstracts. One of the rationales for the Extended Abstracts was to make available timely results that would not have been available in the multi-year, publication process. For the Tenth conference a new publication was developed; the Transaction of the International Permafrost Association (Burn 2013).

49.4 IAEG and IPA

Official relationship between the International Association of Engineering Geologists (IAEG) and IPA began in 2008. The IPA and the IAEG formed the IAEG Commission C21 “Engineering Geology for Development in Permafrost Regions” and the IPA Subgroup with the same title during NICOP in Alaska in 2008. The goal of IPA Subgroup and IAEG C21 is to develop new methodologies for risk assessment and hazard evaluation of permafrost degradation in the context of climate warming by integrating a probabilistic analysis and mapping of permafrost instability. The key objectives of the C21 are: to review and collect examples of risk assessment and hazard evaluation in permafrost regions; to develop new methodologies for risk assessment and hazard evaluation in relation with

permafrost change; to document new methodologies and guidelines for permafrost map-ping related to engineering geology goals; to network with practitioners and academics with an interest in permafrost problems world-wide; and to develop and maintain a dedicated area within the IAEG website. In 2012 the Commission met during TICOP in Salekhard, Russia. The ICOPs are the main platforms for continued and productive collaboration.

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