

Contents

Preface to the Second Edition	xi
Karst and Caves in Carbonate Rocks, Salt and Gypsum	
The Karst in Morocco and the Friouato and Wintimdouine Caves Morocco Nadia Aamoum	2
Desert Cave Studies in the Kingdom of Saudi Arabia Mahmoud Ahmed Al Shanti	3
A Karst Hydrogeologic Investigation to Support Risk Assessment at Patoka Dam, Indiana, USA. Lee Anne Bledsoe, Chris Groves, Kenneth Henn, Jackie Rowe	4
Environmental Vulnerability at the Contact Karst of Monjolos and the Southern Espinhaço Ridge, Minas Gerais, Brazil Leandro Cosme Oliveira Couto, Luiz Eduardo Panisset Travassos	8
The Southernmost Authigenic Karst Plateau of the Levant Amos Frumkin, Daniel Ben-Tov, Vladimir Buslov, Boaz Langford, Eliyahu Valdman, Shemesh Yaaran	9
Hypogenic Caves in Southern Levant Deserts Amos Frumkin, Boaz Langford, Sorin Lisker	13
Hydrogeochemical and Isotopic Characterization of the Tapalqué Creek Upper Basin and its Associated Karst, Buenos Aires, Argentina Glok Galli, Melisa; Barredo Codesal, Silvia P.; Martínez, Daniel E.; Trezza, Mónica A.	16
Some New Caves Under the Dubrovnik City airport in the Dinaric Karst of Croatia Mladen Garašić & Davor Garašić	22
The New Insights About Deep Karst Springs in the Dinaric Karst Of Croatia Mladen Garašić & Davor Garašić	26
Cave Sediments in Škocjanske Jame and Unroofed Caves Above Them, SW Slovenia Nadja Zupan Hajna, Andrej Mihevc, Petr Pruner, & Pavel Bosák	30
Caves of Maratua Island, East Kalimantan-Indonesia Eko Haryono, Haviz Damar Sasongko, Sidiq Harjanta, Mukhammad Awaludin Zaenuri, Juswono Budi Setiawan	33
Morphology of Merabu Karst Mountain, Mangkalihat Peninsula, East Kalimantan-Indonesia Eko Haryono, Ghufrun Zulqisthi, Arief Abdurrahman Hakim, Muhamad Haviz Damar Sasongko, Mohammad Ainul Labib	33
The Jasov Plateau in the Slovak Karst as an Experimental Area for the Denudation Dynamic Research Zdenko Hochmuth, Alena Gessert	34
Tectonic Control of the Permian Gypsum Karst Belt along the Southern Margin of the Harz-Mountains (Germany) Hans-Peter Hubrich and Stephan Kempe	39
Features, Exploitation and Protection of Karst Caves in China Zhongcheng Jiang, Yuanhai Zhang, Weihai Cheng	43

Exploration of the Caves of Isla de Mona, Puerto Rico Patrician N. Kambesis	44
Origin of Enigmatic Caves of the Far Western United States Patrician N. Kambesis, Joel Despain	45
Geomorphology and Hydrogeological Features of the Rječina Karst Spring - Croatia Mladen Kuhta	46
Peculiar CO ₂ Values in a Hungarian Cave with a Lower and Upper Entrance Szabolcs Leél-Össy	51
Mechanism Analysis of Large Scale Sinkhole Formation, Laibin, Guangxi, China Mingtang Lei, Xiaozhen Jiang, Yongli Gao, WeiQuan Luo and Jianling Dai	52
Complex Investigations in Novoafonskaya Cave (Western Caucasus) Mavlyudov B.R, Kuderina T.M., Kadebskaya O.I., Grabenko E.A., Tokarev I.V., Ekba Ya.A., Dbar R.S.	56
Use of the Cave Animal <i>Marifugia cavatica</i> for Reconstruction of Pliocene to Recent Evolution of Karst Relief in W Slovenia Andrej Mihevc, Anton Brancelj, Ivan Horáček	61
Speleogenesis by Weathering of Upper Cretaceous, Coniacian Limestone, Dordogne, France Claude Mouret, Jacques Rolin and Bernard Angeli	65
The Rock Islands of Belau (Palau), Western Pacific: Drowned Polygonal Karst? Joan Mylroie, John Mylroie,	69
Some Outstanding Speleological Features of Lebanon : Typical Semi-arid Mediterranean Karst Fadi Henri Nader	73
Highlights of Romanian Caves and Karst Gheorghe M. Ponta and Victor Ursu	74
Armenia Karst Project Ruggieri Rosario, Daytyan Smbat, Ugujyan Adranik	78
The Cenote Project: Monitoring a High-altitude Ice Cave in the Dolomites, Italy Tommaso Santagata, Francesco Sauro, Christoph Spötl, Daniela Festi, Klaus Oeggel, Luca Dal Molin, Farouk Kadded, Marco Camorani, Alessio Romeo	82
Karst Hydrology in Sub-Arctic Norway Rannveig Øvrevik Skoglund & Stein-Erik Lauritzen	85
Measurement of the Atmospheric CO ₂ Sink from Carbonate Mineral Weathering for Large River Basins: the Ohio River, USA Autumn Turner and Chris Groves	88
Evolution, Development, and Decay of the Caves and Karst of the Greenbrier Valley, West Virginia, USA William B. White* and Elizabeth L. White	93
The Glenelg River Karst Susan White & John Webb	97
The Significance of the Tiankeng Group Discovery in Hanzhong of Central China Yuanhai Zhang	100

Karst and Cave Survey, Mapping and Data Processing

3D Cartography: caveGEOmap and ZEB1 LIDAR Angel A Acosta-Colón	102
Application of Lidar Data for Cave Entrance Identification Miha Čekada, Petra Gostinčar, Borivoj Ladišić,	103
Caveink - a Set of Inkscape Extensions for Drawing Cave Maps Mateusz Golicz	107
Three-dimensional Cave Mapping using Structure from Motion John Hellstrom	112
3-D Imaging as a Tool to Understand Speleogenetic Processes Stephan Kempe and Ingo Bauer	113
Surveying Caves using Zebedee and Bentwing Mike Lake and Jill Rowling	118
Comparison of Shallow Geophysical Cave Detection Methods to 3D Lidar Mapping Evelynn J. Mitchell and Joseph N. Mitchell	122
The Caveatron: an Integrated Cave Survey and LIDAR Scanning Instrument Joe Mitchell and Steve Gutting	126
Inside the Glaciers Project: Laser Scanning of the Grotta Del Gelo (Mount Etna, Italy) Tommaso Santagata, Marco Vattano, Francesco Sauro, Giuseppe Spitaleri, Gaetano Giudice, Corrado Bongiorno, Alessio Romeo, Marta Lazzaroni	131
3D Photogrammetry Modelling Of Ice Moulins On The Grey Glacier, Chilean Patagonia Tommaso Santagata, Alessio Romeo	134
Laser Scanning as a Powerful Tool for Speleogenetic Studies in Quartz-sandstone Caves: the Example of Imawari Yeuta, Venezuela Francesco Sauro, Tommaso Santagata, Leonardo Piccini, Umberto Del Vecchio, Ada De Matteo, Marco Camorani	134
Deterministically Defining Chambers in 3D-Scans of Caves Nico Schertler, Manfred Buchroithner, Donald McFarlane, Guy van Rentergem, Joyce Lundberg, Stefan Gumhold	135
The Pilkington-Lewis Squeeze Index; a Rating System for Cave Constrictions. Heather Siebert	138
Lessons Learned from a Large-Scale 3-D Mapping Project, with Faro Laser Scanners, of the Gomantong Caves, Borneo Guy Van Rentergem, Donald McFarlane, Joyce Lundberg, Manfred Buchroithner	139
Mathematical Modelling of the Relationship Between Terrestrial Lidar Scan Point Density and Volumetric Assessment of Underground Cavities Guy Van Rentergem, Donald McFarlane, Joyce Lundberg, Manfred Buchroithner	142
World's First Geophysical Survey of Bat Guano: Phase 1 and 2 Results George Veni	145
Mapping and Imaging the World's Largest Chambers in 3D Richard Roo Walters	148
Exploring for New Caves on the Nullarbor Plain, Australia Nicholas White, Ken Boland, Daryl Carr, Greg Leeder	149

Karst, Pseudokarst and Caves in Other Rocks

An Unusual Maze Cave in Sandstone, NE Thailand John Dunkley & Terry Bolger	153
Historical Notes and Research History of the Non-karst Caves in Hungary István Eszterhás, George Szentés	154
Origin of Caves in Glaciers and Glacial Sheets Mavlyudov B.R.	158
Piping Cave Development in a High Gradient Setting: Kutz Canyon, New Mexico, USA Douglas M. Medville	163
Types of Caves Present in Kalimantan Barat Province, Borneo, Indonesia Claude Mouret	167
Speleogenesis Underneath Basaltic Lava Flows in Niut Mountains, Kalimantan Barat, Borneo, Indonesia Claude Mouret	172
Some Fundamental Features of Speleogenesis in Sandstone Claude Mouret	174
Caves and Other Features in Glaciers and Icebergs, Graham Land, Antarctica Claude Mouret	180
Scientific Researches and Explorations in Quartzite and Quartz-sandstone Caves Francesco Sauro, Robert A.L. Wray	184

Lava and Volcanic Caves

Um Jirsan Lava Tube Cave Mahmoud Ahmed Al Shanti	186
The Complexity of Pyroduct (“Lava Tubes”) Genesis: Bird Park Cave, Hawaii Volcanoes National Park Stephan Kempe, Christhild Ketz-Kempe, Harry Shick	188
Outstanding Universal Values of some Lava Tube Caves in Jeju Island for Potential World Heritage Nomination Woo, Kyung-Sik, Kim Lyoun, Han Hyung-chul, Ki, Jin-Seok	193

Medicine, Philosophy, Social Aspects

Human Body Responses During Cave Expeditions: a Systematic Review and Potential Future Implications Loredana Bessone, Lucrezia Zuccarelli, Emily BJ Coffey, Giacomo Strapazzon	196
Caves and Geotourism Greg Brick	200
Cultural Karst-Landscape: a New Methodology of Social Science Research in Tropical Karst Regions Yayum Kumai	202

Modelling in Karst and Cave Environments

- Small-scale Modelling of Arenitic Caves in South American Tepuis: Make your own Tepui at Home. 204
Roman Aubrecht, Tomáš Lánczos, Ján Schlögl, Marek Audy and Petronela Filipčíková
- Driving Pressure of Subterranean Airflows: an Analysis 208
Giovanni Badino
- A Theoretical Approach to the Estimation of Local Entropy Production in Caves 212
Giovanni Badino
- Mapping Carbonate and Evaporite Brackish Aquifers, Texas, USA 217
Andrea Croskrey
- Chemical Analysis of Underground Waters in Štefanová Cave (Central Slovakia) and its use for Finding Connections with Cave Slobody 218
Pavel Herich, David Havlíček, Kateřina Havlíčková
- Geothermal Heat Flow in Caves: Modelling of Geothermal Heat Flow 221
Neville A. Michie
- Vadose Zone Hydrogeology in the Bossea Cave System (Southern Piedmont, Northern Italy) 225
Bartolomeo Vigna, Adriano Fiorucci, Alessia Nannoni, Jo De Waele
- Effects of Photosynthesis and Groundwater Input on Diel Variations of Electrical Conductivity and Calcite Precipitation in Chaotian River, Guilin, China 229
Cheng Zhang, Jinliang Wang, Qiong Xiao

Speleological Research and Activities in Artificial Caves

- A 100-km-Long Subterranean Roman Aqueduct in Northern Jordan? 234
Stephan Kempe and Ahmad Al-Malabeh
- Hypogea 2015 and 2017: a Short, but very Intense, History 239
Mario Parise, Roberto Bixio, Carla Galeazzi, Ali Yamac

Speleogenesis

- Karst Morphological Processes and Evolution of the Limestone Massif of Georgia from Depositional, Sedimentary, and Structural Investigations in Muradi Cave 244
Lasha Asanidze, Zaza Lezhava, Kukuri Tsikarishvili, Nino Chikhradze, Jason S. Polk
- A Third Kind of Cave in the World: Anthropogenic 251
Greg Brick
- Shallow Caves and Blowholes on the Nullarbor Plain, Australia – Flank Margin Caves on a Low Gradient Limestone Platform 252
Shannon Burnett, Susan White, John Webb
- Evaluation of Possible Ongoing Upwards Condensation Corrosion in Cueva del Pastor (Iberian Chain), Spain 255
Kelsey Budahn, Ira D. Sasowsky, Francisco Gutiérrez, Mario Gisbert
- Age and Speleogenesis of Gypsum Caves in Emilia-Romagna (N Italy) 260
Andrea Columbu, Veronica Chiarini, Jo De Waele, Russell Drysdale, Jon Woodhead, John Hellstrom and Paolo Forti

Why we Should Thank a Proterozoic Meteorite for the Caves at Assynt, NW Scotland, UK Trevor Faulkner	265
Are There any Pre-Quaternary Caves in Scandinavia? Trevor Faulkner	269
Speleogenesis in Two Highly Contrasting Epigenic Limestone Lithologies Trevor Faulkner And Susan White	275
Carbonate Hostrock Weathering by Sea Salt Precipitation in El Orón-Arco Cave (Cartagena, SE Spain) Fernando Gázquez, José-María Calaforra, Fernando Rull, Jesús Medina, Andrés Ros, José Luis Llamusi and Juan Sánchez	276
United we Divide: Speleogenesis in the Vertical Vadose Zone Philipp Häuselmann	280
Hypogene? Caves Modified by Meteoric Flows - Geomorphology of Cliefden Caves and the Belubula River Valley Ian Houshold and Armstrong Osborne	283
The Oldest Meteoric Caves in Norway? The Reingardslia Cave Documentation Project. Stein-Erik Lauritzen, Rannveig Øvrevik Skoglund, Marie Heggstad, Hege Kilhavn, Severin Lølkes, Einar Taule Øyehaug, Ida Marie Gabrielsen, Alexander Gulbrandsøy Stadheim, Sverre Aksnes	287
Pre-Quaternary, hypogenetic caves in south Norway Stein-Erik Lauritzen, Sven Dahlgren	287
Analysis of Scallops in Gomantong Caves, by GIS Processing of 3D Terrestrial Laser Scanner Data Joyce Lundberg, William Carroll, Warren Roberts, Donald A McFarlane, Manfred Buchroithner, and Guy van Rentergem	288
Flank Margin Caves in Telogenetic Limestones in Italy Arriolabengoa Martin, D'Angeli Ilenia Maria, De Waele Jo, Parise Mario, Ruggieri Rosario, Sanna Laura, Madonia Giuliana, Vattano Marco	292
Geothermal Heat Flow in Caves: Heat Concentration and its Effects on Speleogenesis. Neville A Michie	296
A Chronology of Karstification in Puerto Rico Using Cosmogenic Dating of Cave Sediments Thomas E. Miller, Gilles Brocard, Jane K. Willenbring	300
Tracing the Origin of Cave Sands: State of the Art in the Moravian Karst Jiří Robert Otava	304
Interpretation of Regional Geomorphic Events from Dissolution Caves Arthur N Palmer	308
Variation Between Lithology, Carbonate Versus Sandstone, as an Erosional Control on a Fluviokarst System Eric Wade Peterson, Toby J Dogwiler, Andrew Francis	309
Exploring the Mechanisms and Consequences of Cave Roof Collapses Using the National Corvette Museum Sinkhole Case Study Jason S Polk, Leslie North, Pat Kambesis, Brian Ham, Ric Federico	310
Contenda Cave Genesis (Estremenho Karst Massif, Portugal) Rodrigues, P., Robalo, P., Amendoeira, V.	311
The Origin of Jewel Cave and its Relationship to Landscape-Scale Processes – Part 1 Michael E. Wiles	315

The Origin of Jewel Cave and its Relationship to Landscape-Scale Processes – Part 2 Michael E. Wiles	318
Influence factors of Karst Caves Development and Its Response of Quaternary Environment, Jingxi, China Shi Wenqiang, Erin Lynch, Zhang Yuanhai	321
Speleothem Research	
An Hypothesis on the Evolution of Complex Flowstones Giovanni Badino, José Maria Calaforra, Jo De Waele & Paolo Forti	323
Multiproxy Analysis of Holocene Stalagmites from Bosnia and Herzegovina Chiarini V., Couchoud I., Drysdale R., Bajo P., Milanolo S. Hellstrom J. Frisia S., De Waele J.	328
Comparison of South Asian and Tropical Australian Stalagmites Reveals Expansion and Contraction of the Indo-Pacific Tropical Rain Belt over the Last 3000 Years Rhawn F. Denniston*, Caroline C. Ummenhofer, Alan D. Wanamaker, Jr., Matthew S. Lachniet, Gabriele Villarini, Yemane Asmerom, Victor J. Polyak, John Cugley, David Woods, William F. Humphreys	332
Periods of Speleothem Growth in Northern Eurasian Caves: a Preliminary Overview Yuri V. Dublyansky, Christoph Spötl, Denis Scholz, Gina E. Moseley, Lawrence R. Edwards	336
Stalagmite Isotopic Record from Mallorca (Western Mediterranean) over the Last 120 ka: Paleoclimatic Implications Oana-Alexandra Dumitru, Bogdan P Onac, Victor J Polyak, Jonathan G Wynn, Yemane Asmerom, Joan J Fornós	337
Geochronology of Jinfo Cave, the Oldest Cave in China Huang Bao-Jian, Zhang Jing, Zhai Xiu-Min, Luo Shu-Wen, Shi Wen-Qiang	338
Geothermal Heat Flow in Caves: the Physics of the Geothermal Rims in Carlsbad Cavern. Neville A. Michie	340
The Genesis of Hollow Stalagmites in Caves of the Khammouane Karst, Laos Claude Mouret	343
Symmetrical Helictites and Geopetal forms from South Eastern Australian Caves Jill Rowling	347
3D Photogrammetry of Speleothems with the Astronauts of the European Space Agency “CAVES” Training Course Tommaso Santagata , Jo De Waele , Francesco Sauro , Loredana Bessone	352
Multilevel Karst System Evolution in Relationship to Palaeoclimate and Palaeogeography: Hints from a 500 Ky Speleothem Record from the Piani Eterni Karst System, Belluno Dolomites, Italy Francesco Sauro , Andrea Columbu , Joyce Lundberg , Jo De Waele	354
Recent Developments in Speleothem Research Jon D. Woodhead*, John Hellstrom, J.M. Kale Sniderman, Russell N. Drysdale	358
Sustainable Development of Karst	
Support for Sustainable Eco-tourism in Puerto Princesa Underground River (Palawan, Philippines) – Project 2016-2017 Antonio De Vivo, Paolo Forti, Leonardo Piccini	362

Karst Underground Protection, Education and Rise of Public Awareness: Examples from Slovenia Nadja Zupan Hajna	367
Educational Film ŽIVO! (“LIFE!”) – Life and Water in the Karst Region Nadja Zupan Hajna, Metka Petrič, Nataša Ravbar	371
Evaluating Human-Environmental Impacts to the Karst Landscape of Phong Nha-Ke Bang National Park, Vietnam using a modified Karst Disturbance Index Methodology: Implications for Sustainable Tourism Leslie North, Jason Polk, Nguyet Vu Thi Minh, Tuan Tong Phuc, Vo Van Tri	375
The Geoheritage Significance of Cliefden Caves, NSW, Australia Armstrong Osborne	376
Index of the Sustainable use of Karst Environments Philip van Beynen	380
Sanitation and Right to Health: an Analysis of Urban Solid Waste Disposal in the Karst of Minas Gerais, Brazil Isabela Dalle Varela, Luiz Eduardo Panisset Travassos	381
Other Topics	
FINSPAC Through the Ages Alkantana, Cahyo	383
A Verbal Dispute Between a Bat and a Partridge: a Satiric Allegorical Poem from the Medieval Period Konstantina Aretaki	384
Linked Data, the Semantic Web, and the Karst Information Portal Jason Boczar, George Veni	389
The PSS and the 16th Year of the Annual Philippine National Cave Congress. Eric Bontuyan	392
European Cave Rescue Association – Mature Organization Dinko Novosel, Alberto Ubertino, Kurt Dennstedt, Antonya Vlaykova, Darko Baksic, Markus Auer, Pete Allwright, Gyula Hegedus, Lana Djonlagic, Ulrich Neageli, Maks Merela, Marko Zakrajsek	393
Caving Activities as a Support for the Analysis of Natural and Anthropogenic Disasters Mario Parise	394
Can the UIS also Become a Sports Body and Why Should It? Arjan van Waardenburg	399
Restructuring the UIS Arjan van Waardenburg	401
Is In-cave Competition Really Unacceptable? Arjan van Waardenburg	403
Author Index Volume 2	404