

# **Sustainable Civil Infrastructures**

## **Editor-in-chief**

Hany Farouk Shehata, Cairo, Egypt

## **Advisory Board**

Dar-Hao Chen, Texas, USA

Khalid M. El-Zahaby, Giza, Egypt

### *About this Series*

Sustainable Infrastructure impacts our well-being and day-to-day lives. The infrastructures we are building today will shape our lives tomorrow. The complex and diverse nature of the impacts due to weather extremes on transportation and civil infrastructures can be seen in our roadways, bridges, and buildings. Extreme summer temperatures, droughts, flash floods, and rising numbers of freeze-thaw cycles pose challenges for civil infrastructure and can endanger public safety. We constantly hear how civil infrastructures need constant attention, preservation, and upgrading. Such improvements and developments would obviously benefit from our desired book series that provide sustainable engineering materials and designs. The economic impact is huge and much research has been conducted worldwide. The future holds many opportunities, not only for researchers in a given country, but also for the worldwide field engineers who apply and implement these technologies. We believe that no approach can succeed if it does not unite the efforts of various engineering disciplines from all over the world under one umbrella to offer a beacon of modern solutions to the global infrastructure. Experts from the various engineering disciplines around the globe will participate in this series, including: Geotechnical, Geological, Geoscience, Petroleum, Structural, Transportation, Bridge, Infrastructure, Energy, Architectural, Chemical and Materials, and other related Engineering disciplines.

More information about this series at <http://www.springer.com/series/15140>

Janusz Wasowski · Daniele Giordan  
Piernicola Lollino  
Editors

# Engineering Geology and Geological Engineering for Sustainable Use of the Earth's Resources, Urbanization and Infrastructure Protection from Geohazards

Proceedings of the 1st GeoMEast International  
Congress and Exhibition, Egypt 2017  
on Sustainable Civil Infrastructures

 Springer



*Editors*

Janusz Wasowski  
Institute for Geo-hydrological  
Protection (IRPI)  
National Research Council (CNR)  
Bari  
Italy

Piernicola Lollino  
Institute for Geo-hydrological  
Protection (IRPI)  
National Research Council (CNR)  
Bari  
Italy

Daniele Giordan  
Institute for Geo-hydrological  
Protection (IRPI)  
National Research Council (CNR)  
Bari  
Italy

ISSN 2366-3405  
Sustainable Civil Infrastructures  
ISBN 978-3-319-61647-6  
DOI 10.1007/978-3-319-61648-3

ISSN 2366-3413 (electronic)  
ISBN 978-3-319-61648-3 (eBook)

Library of Congress Control Number: 2017946435

© Springer International Publishing AG 2018

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by Springer Nature  
The registered company is Springer International Publishing AG  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Preface

Toward building sustainable and longer civil infrastructures, the engineering community around the globe continues undertaking research and development to improve existing design, modeling, and analytical capability. Such initiatives are also the core mission of the Soil-Structure Interaction Group in Egypt (SSIGE) to contribute to the ongoing research toward sustainable infrastructure. This conference series “GeoMEast International Congress and Exhibition” is one of these initiatives.

Ancient peoples built their structures to withstand the test of time. If we think in the same way, our current projects will be a heritage for future generations. In this context, an urgent need has quickly motivated the SSIGE and its friends around the globe to start a new congress series that can bring together researchers and practitioners to pursue “Sustainable Civil Infrastructures.” The GeoMEast 2017 is a unique forum in the Middle East and Africa that transfers from the innovation in research into the practical wisdom to serve directly the practitioners of the industry.

More than eight hundred abstracts were received for the first edition of this conference series “GeoMEast 2017” in response to the Call for Papers. The abstracts were reviewed by the Organizing and Scientific Committees. All papers were reviewed following the same procedure and at the same technical standards of practice of the TRB, ASCE, ICE, ISSMGE, IGS, IAEG, DFI, ISAP, ISCP, ITA, ISHMII, PDCA, IUGS, ICC, and other professional organizations who have supported the technical program of the GeoMEast 2017. All papers received a minimum of two full reviews coordinated by various track chairs and supervised by the volumes editors through the Editorial Manager of the SUCI “Sustainable Civil Infrastructure” book series. As a result, 15 volumes have been formed of the final +320 accepted papers. The authors of the accepted papers have addressed all the comments of the reviewers to the satisfaction of the track chairs, the volumes editors, and the proceedings editor. It is hoped that readers of this proceedings of the GeoMEast 2017 will be stimulated and inspired by the wide range of papers written by a distinguished group of national and international authors.

Publication of this quality of technical papers would not have been possible without the dedication and professionalism of the anonymous papers reviewers. The names of these reviewers appear in the acknowledgment that follows. For any additional reviewers whose names were inadvertently missed, we offer our sincere apologies.

We are thankful to Dr. Hany Farouk Shehata, Dr. Nabil Khelifi, Dr. Khalid M. ElZahaby, Dr. Mohamed F. Shehata, and to all the distinguished volumes editors of the proceedings of the GeoMEast 2017. Appreciation is extended to the authors and track chairs for their significant contributions. Thanks are also extended to Springer for their coordination and enthusiastic support to this conference. The editors acknowledge the assistance of Ms. Janet Sterritt-Brunner, Mr. Arulmurugan Venkatasalam in the final production of the 15 edited volumes “Proceedings of GeoMEast 2017”.

# Contents

<b>Site Investigation Using Engineering Geology Mapping and Geological Hazard Evaluation: Case Study of the New Hail Economic City, Hail Region, KSA</b> . . . . .	1
Turki E. Al-Sehly, Ahmed M. Youssef, Abdulla A. Al-Otaibi, and Hassan M. Al-Harbi	
<b>Pre-design Site Investigation for an Oil and Gas Facility in the Marginal Lands of the Nigerian Niger Delta Sub-region</b> . . . . .	20
So-ngo Clifford Teme	
<b>Geotechnical Properties of Expansive Clay Shale in El-Mahrowsa, Qena, Egypt</b> . . . . .	41
M. Abd Ellatief, M. Mahmoud, and H. Abdo	
<b>Contribution of Zeolite to Deterioration of Pelitic Rocks from Asu-River Group and Variation of the Deterioration with Water Sorption</b> . . . . .	63
Tochukwu A.S. Ugwoke	
<b>Detection of Elastic Region Varied by Inherent Anisotropy of Reconstituted Toyoura Sand</b> . . . . .	76
Bao Ngoc Le, Hirofumi Toyota, and Susumu Takada	
<b>Wireless MEMS-Based In-Place Inclinator-Accelerometer Array for Real-Time Geotechnical Instrumentation</b> . . . . .	90
Victoria Bennett, Tarek Abdoun, Kathleen O'Meara, Matthew Barendse, and Thomas Zimmie	
<b>Study of Bench Stability in the Phosphate Mine (Algeria)</b> . . . . .	101
Mohamed Fredj, Abdallah Hafsaoui, Youcef Khadri, Boukarm Riadh, Radouane Nakache, Abderrazak Saadoun, and Kamel Menacer	

<b>Cracking Mechanism Along the North Batter of Maddingley Brown Coal Open Pit Mine, Victoria, Australia</b> . . . . .	115
Lei Zhao and Greg You	
<b>Research Progress on Comprehensive Control Technologies for Abandoned Coal Mine Hidden Disasters in China</b> . . . . .	130
Wen Li	
<b>Landslide Susceptibility Mapping of Tizi-Ouzou Region, Algeria</b> . . . . .	140
Amel Kab, Lynda Djerbal, and Ramdane Bahar	
<b>Karst Induced Geo-hazards in Egypt: Case Study Slope Stability Problems Along Some Selected Desert Highways</b> . . . . .	149
Ahmed M. Youssef, Abdel-Hamid El-Shater, Mohamed H. El-Khashab, and Bosy A. El-Haddad	
<b>Shallow Seismic Refraction Tomography and MASW Survey for Investigating the Fractures Along Qena-Safaga Road, South of Egypt</b> . . . . .	165
Ahmed M. Abdel Gowad, Michele Punzo, Vincenzo Di Fiore, Daniela Tarallo, Assem El-Haddad, and Abdel Hady Al-Akraby	
<b>Shallow Seismic Investigation of the Yangtze River Fault at Zhenjiang, Jiangsu Province, China</b> . . . . .	192
Guang-ya Wang, Greg You, Ming-zhu Chen, Guo-xing Zhou, and E. Jian	
<b>Normal Fault Movement Propagation in Overlying Seabed Deposits</b> . . . . .	206
Lama Thebian, Salah Sadek, Shadi Najjar, and Mounir Mabsout	
<b>Hydrodynamic Performance of Coastal Geotube Embankment with and Without Gabion Boxes</b> . . . . .	220
S. Sherlin Prem Nishold, R. Sundravadivelu, and Nilanjan Saha	
<b>Insights into Hydro-mechanical Behavior of Bentonite Based Seals for Deep Geological Repositories</b> . . . . .	239
Nadia Mokni and Agustin Molinero Guerra	
<b>Aquifer Distribution and Flow Patterns of Land Jatianangor Educational Area, Sumedang Regency, West Java Province</b> . . . . .	253
Andreas Franzona Pangaribuan, Febriwan Mohammad, and Deden Zaenuddin Muttaqin	
<b>Integrating Remote Sensing and GIS for Mapping Garbage Dump Areas in the Kingdom of Bahrain</b> . . . . .	262
Khalil I. Al-Joburi	



<b>Geology and Remote Sensing Investigations in Antarctic Environments</b> . . . . .	272
Amin Beiranvand Pour, Mazlan Hashim, and Yongcheol Park	
<b>Author Index</b> . . . . .	283