

Proceedings of the 15th International Coastal Symposium (ICS2018)

Source: Journal of Coastal Research, 85(sp1)

Published By: Coastal Education and Research Foundation

URL: <https://doi.org/10.2112/1551-5036-85.sp1.ii>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Proceedings
of the 15th International Coastal Symposium

JOURNAL OF COASTAL RESEARCH

Haeundae, Busan, 13-18 May 2018

Special Issue No. 85 Vol.1



Edited by : Jae-Seol Shim, Insik Chun, and Hak Soo Lim



JOURNAL OF COASTAL RESEARCH

An International Forum for the Littoral Sciences

CHEF-HERAUSGEBER

25 Jake Ridge Trail
Fletcher, NC
28732, U.S.A.

BOOK REVIEW EDITOR

Luciana S. Esteves
Faculty of Science and Technology
Bournemouth University
Dorset, England, U.K.
lestevs@bournemouth.ac.uk

EDITOR-IN-CHIEF

Charles W. Finkl

Coastal Education and Research Foundation, Inc. [CERF]

Editorial Offices:

5130 NW 54th Street
Coconut Creek, FL 33073, U.S.A.

(Editorial Office, Coconut Creek)

CERF/JCR Website: <http://www.CERF-JCR.org>
e-mail: cfinkl@cerf-jcr.com

RÉDACTEUR-EN-CHEF

WEB DESIGN & DEVELOPMENT

Jon Finkl
Media Mine
17600 River Ford Drive
Davidson, NC 28036, U.S.A.
jon@mediamine.net

DEPUTY EDITOR-IN-CHIEF

Christopher Makowski
Coastal Education and Research
Foundation, Inc. [CERF]
5130 NW 54th Street
Coconut Creek, FL 33073, U.S.A.
cmakowski@cerf-jcr.com

EDITORIAL ASSISTANT

Barbara Russell
Coastal Education and Research
Foundation, Inc. [CERF]
5130 NW 54th Street
Coconut Creek, FL 33073, U.S.A.
barbara@cerf-jcr.com

MITHERAUSGEBER

Edward J. Anthony
Coastal Geomorphology
Dunkerque, France
Kenneth Banks
Coral Reef Geomorphology
Plantation, Florida
Patrick Barnard
Coastal Geomorphology
Santa Cruz, California
Lindino Benedet
Oceanography, Modeling
Florianopolis, SC, Brazil
David M. Bush
Coastal Geology & Hazards
Carrollton, Georgia
Ilya V. Buynevich
Coastal Geology
Philadelphia, Pennsylvania
Javier A. Carrió
Sediment Processes
Valencia, Spain
Insik Chun
Coastal Engineering
Seoul, Republic of Korea
Vanda Claudino-Sales
Coastal Dynamics, Dunes
Ceará, Brazil
Mark Crowell
Coastal Zone Management
McLean, Virginia
Omar Defeo
Sandy Beach Ecology
Montevideo, Uruguay
J. Javier Diez
Coastal Geomorphology
Madrid, Spain
Joseph F. Donoghue
Coastal Morphology & Hazards
Orlando, Florida
Jean Ellis
Aeolian Sediment Transport
Columbia, South Carolina
Luciana Esteves
Coastal Flooding & Erosion
Bournemouth, England, UK
Niki Evelpidou
Sea-Level Change,
Palaeogeography
Athens, Greece
Oscar Manuel Ferreira
Storm Impacts
Faro, Portugal

Duncan M. FitzGerald
Sediment Transport
Boston, Massachusetts
Chip Fletcher
Coastal Geology
Honolulu, Hawaii
Kazimierz K. Furmańczyk
Marine Cartography
Szczecin, Poland
Allen Gontz
Geophysics, Stratigraphy
San Diego, California
Gary B. Griggs
Coastal Engineering & Hazards
Santa Cruz, California
Pramod Hanamgond
Coastal Geomorphology
Belgaum, India
Hans Hanson
Coastal Protection
Lund, Sweden
Simon Haslett
Paleoceanography
Swansea, Wales, UK
David Hill
Nearshore Hydrodynamics
Corvallis, Oregon
Michael Hilton
Dune Geomorphology & Ecology
Dunedin, New Zealand
Carl H. Hobbs, III
Coastal Geology, Sand Mining
Gloucester Point, Virginia
James R. Houston
Sea-Level Change
Vicksburg, Mississippi
Wenrui Huang
Coastal Hydrodynamics
Tallahassee, Florida
Michael G. Hughes
Coastal Morphodynamics
Canberra, ACT, Australia
Federico I. Isla
Sea-Level Change
Mar Del Plata, Argentina
Nancy L. Jackson
Coastal Geomorphology
Newark, New Jersey
Markes E. Johnson
Paleoshores, Coastal Sand Dunes
Williamstown, Massachusetts

ASSOCIATE EDITORS

Timothy R. Keen
Waves & Circulation
Stennis Space Center, Mississippi
Dieter H. Kelletat
Coastal Geomorphology
Essen / Cologne, Germany
Joseph T. Kelley
Sea-Level Change
Orono, Maine
Vic Klemas
Remote Sensing
Newark, Delaware
Nobuhisa Kobayashi
Coastal Engineering
Newark, Delaware
Vladimir N. Kosmynin
Coral Reefs, Coastal Ecology
Tallahassee, Florida
Michael J. Lace
Coastal Landforms & Processes
West Branch, Iowa
Stephen P. Leatherman
Barrier Islands, Beach Erosion
Miami, Florida
Charles Lemckert
Environmental Fluid Dynamics
Bruce, ACT, Australia
Hak Soo Lim
Hydrodynamics, Coastal
Engineering
Busan, Republic of Korea
Ioannis Liritzis
Geophysical Proxy Data
Rhodes, Greece
Michel M. de Mahiques
Sediment Processes
São Paulo, Brazil
Gonzalo C. Malvárez-Garcia
Beach Morphodynamics
Seville, Spain
Ashish J. Mehta
Coastal Engineering
Gainesville, Florida
Nobuo Mimura
Environmental Engineering
Ibaraki, Japan
Fatima Navas
Coastal Morphodynamics
Seville, Spain
Robert Nicholls
Global Climate Change
Southampton, England, UK

Karl F. Nordstrom
Coastal Geomorphology
New Brunswick, New Jersey
Julian Orford
Gravel Beaches, Storm Events
Belfast, Northern Ireland, UK
Phil D. Osborne
Sediment Dynamics
Shoreline, Washington
Hugh Parker
Airborne Lidar Bathymetry
Adelaide, SA, Australia
Charitha B. Pattiaratchi
Physical Oceanography
Crawley, WA, Australia
Carlos Pereira da Silva
Coastal Zone Management
Lisbon, Portugal
Michael Phillips
Coastal Geomorphology
Swansea, Wales, UK
Orrin H. Pilkey, Jr.
Coastal Geology
Durham, North Carolina
Robert P. Psuty
Coastal Geomorphology
New Brunswick, New Jersey
Ulrich Radtke
Coastal Geomorphology
Duisburg-Essen, Germany
Elijah W. Ramsey, III
Coastal Image Processing
Lafayette, Louisiana
Kirt Rusenko
Sea Turtles, Dune Restoration
Boca Raton, Florida
Daniele Scarponi
Marine Paleocology
Bologna, Italy
Anja Scheffers
Coastal Hazards,
Palaeoclimatology
Lismore, NSW, Australia
Vic Semeniuk
Mangroves
Perth, WA, Australia
Douglas J. Sherman
Coastal & Aeolian Geomorphology
Tuscaloosa, Alabama
Andrew D. Short
Coastal Geomorphology
Sydney, NSW, Australia

COMITÉ DE REDACTION

Pravi Shrestha
Coastal Engineering
Irvine, California
Tom Spencer
Biogeomorphology
Cambridge, England, UK
Marcel Stive
Coastal Hydrodynamics
Delft, The Netherlands
Vallam Sundar
Coastal Engineering
Chennai, India
E. Robert Thieler
Marine Geology
Woods Hole, Massachusetts
Arthur C. Trembanis
Coastal Morphodynamics
Newark, Delaware
Frank Van Der Meulen
Coastal Zone Management
Delft, The Netherlands
Ana Vila Concejó
Coastal Morphodynamics
Sydney, NSW, Australia
Ian J. Walker
Coastal Dunes & Sediments
Tempe, Arizona
Ping Wang
Beach Morphodynamics
Tampa, Florida
Phil Watson
Sea-Level Change
Gosford, NSW, Australia
Allan Williams
Coastal Geology
Swansea, Wales, UK
Harry F. Williams
Paleotempestology
Denton, Texas
Colin D. Woodroffe
Coastal Geomorphology
Wollongong, NSW, Australia
Zhaoping Yang
Hydrodynamic Modeling
Seattle, Washington
Robert S. Young
Coastal Processes
Cullowhee, North Carolina
Guoliang Yu
Sediment Transport
Shanghai, China



THE JOURNAL OF COASTAL RESEARCH (JCR) (ISSN 0749-0208) IS PUBLISHED BIMONTHLY FOR \$115.00 FOR INDIVIDUAL US CERF MEMBERS, \$125.00 FOR INDIVIDUAL INTERNATIONAL CERF MEMBERS, \$519.00 FOR US INSTITUTIONS, AND \$541.00 FOR INTERNATIONAL INSTITUTIONS BY THE COASTAL EDUCATION AND RESEARCH FOUNDATION, INC. (CERF), 5130 NW 54TH STREET, COCONUT CREEK, FL 33073-3713. PERIODICALS POSTAGE PAID AT FORT LAUDERDALE, FL AND ADDITIONAL MAILING OFFICES. **POSTMASTER:** SEND ADDRESS CHANGES TO JOURNAL OF COASTAL RESEARCH, ALLEN PRESS ASSOCIATION MANAGEMENT, P.O. BOX 1897, LAWRENCE, KS 66044-3018.

© 2018 Coastal Education and Research Foundation, Inc. [CERF].

Ⓢ This paper meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

COASTAL EDUCATION AND RESEARCH FOUNDATION

5130 NW 54th Street
Coconut Creek, FL 33073, U.S.A.

Officers of the Foundation

Founded in 1983 by: Charles W. Finkl, Sr. (Deceased),
Charles W. Finkl, Jr., Rhodes W. Fairbridge (Deceased),
and Maurice L. Schwartz (Deceased)



**President &
Executive Director:**
Charles W. Finkl

**Senior Vice President &
Assistant Director:**
Christopher Makowski

Secretary:
Heather M. Vollmer

Executive Assistant:
Barbara Russell

Regional Vice Presidents

North America
James R. Houston
Victor V. Klemas
Orrin H. Pilkey, Jr.

Western Europe
Luciana Esteves
Carlos Pereira da Silva
Michael Phillips
Marcel J.F. Stive

South America
Vanda Claudino-Sales
Omar Defeo

Eastern Europe
Niki Evelpidou
Kazimierz K. Furmanczyk

Oceania
Charles Lemckert
Anja Scheffers
Vic Semeniuk
Andrew D. Short

Southeast Asia
Nobuo Mimura

Board of Directors (Trustees)

J. Andrew G. Cooper	Victor V. Klemas	Elijah W. Ramsey, III
Charles W. Finkl	Charles Lemckert	Vic Semeniuk
Erlend J. Frederickson	Christopher Makowski	Andrew D. Short
Gary B. Griggs	Carlos Pereira da Silva	Daniel J. Stanley
James R. Houston	Michael Phillips	Marcel J.F. Stive
Robert Huff	Orrin H. Pilkey, Jr.	Allan Williams
Joseph T. Kelley	Norbert P. Psuty	

Lifetime Members

Frédéric Bouchette	Björn Kjerfve	Fatima Navas
Yong-Sik Cho	Tetsuya Kusuda	Philip D. Osborne
Nicholas K. Coch	Stephen P.	Yoshiki Saito
Hany Elwany	Leatherman	Charles Thibault
Kazimierz K.	Charles Lemckert	Erik van Wellen
Furmanczyk	Gonzalo C.	Ya Ping Wang
Paul S. Kench	Malvárez-García	Wei Zhang

Patron Members

Lindino Benedet	Carl H. Hobbs, III	Norbert P. Psuty
Georges Chapalain	Timothy W. Kana	Robert S. Young
John B. Gallagher		

CERF Society Information

The Coastal Education and Research Foundation [CERF] is a nonprofit society dedicated to the advancement of the coastal sciences. The Foundation is devoted to the multi-disciplinary study of the complex problems of the coastal zone. The purpose of CERF is to help translate and interpret coastal issues for the public and to assist professional research and public information programs. The Foundation specifically supports and encourages field and laboratory studies on a local, national, and international basis. Through the medium of scientific publications, television, and radio CERF brings accurate information to the public and coastal specialists on all aspects of coastal issues in an effort to maintain or improve the quality of shoreline resources.

Because CERF is concerned with broad environmental issues, our efforts concentrate on significant problems such as maintenance of good quality (potable) water with adequate supply, and hazards associated with potential beach erosion, flooding, and susceptibility of developed shorelines to storm surge and wave attack. By focusing attention on these potential man-made and natural hazards, it is hoped that our research efforts will help others improve the quality of life in diverse coastal areas. CERF thus aims to stimulate awareness of coastal (marine and freshwater shorelines) land and water problems; initiate and foster research and innovation to promote long-term coastal productivity; establish an educational forum for the debate of contentious coastal issues; and develop new principles and approaches for enlightened coastal management, and encourage their adoption and use.

□ CERF MEMBERSHIP □

Members are individuals that support the aims of the foundation through personal and group efforts or by donations. Memberships are available in different categories with privileges.

Subscription information is available online at www.cerf-jcr.org. Subscriptions office: Allen Press, Inc., P.O. Box 1897, Lawrence, KS 66044, U.S.A. CERF@allenpress.com

Editor-in-Chief

Charles W. Finkl Ph.D., CSci, CMarSci, FIMarEST, CPGS, CPSSc, PWS, MASCE

Dr. Charles W. Finkl is President and Executive Director of the Coastal Education and Research Foundation [CERF], publisher of the JCR. Charlie, a founding editor of the *Journal of Coastal Research*, has served as Editor-in-Chief for the past 34 years. He is a Research Professor in the Department of Geosciences at Florida Atlantic University in Boca Raton, Florida. He received his Bachelor and Master of Science degrees from Oregon State University and the Ph.D. from the University of Western Australia. He is a member of more than 20 professional societies and has published more than 200 professional papers, books, and reports. He is a Chartered Marine Scientist (CMarSci) [Institute of Marine Engineering, Science and Technology], Certified Professional Geological Scientist (CPGS) [American Institute of Professional Geologists (AIPG)], Certified Professional Soil Scientist (CPSSc) [American Registry of Certified Professionals in Agronomy, Crops, and Soils], and a Professional Wetland Scientist (PWS) [Society of Wetland Scientists]. Charlie has field experience in parts of the USA, Caribbean area, Brazil, Honduras, Russia, South Africa, Western Europe, Australasia, and South Pacific islands. He is also the Series Editor of the Encyclopedia of Earth Sciences Series that is published by Springer (Germany). There are more than twenty-eight volumes in the Series and about twenty-five are available online. Charlie also serves on the Editorial Board of the *International Journal of Environmental Studies* (Routledge) and is an occasional peer reviewer for many other professional journals.

Charlie has interests and expertise in the general areas of surficial geology, coastal and marine geomorphology (including coastal classification), coastal/marine biophysical environments, exploration geochemistry, soils and weathering (regolith geology), coastal zone management and engineering applications or impacts on natural systems (including erosion control and shore protection), coastal hydrology including submarine freshwater and mineralized seeps, subaerial and marine structural geology, natural hazard mitigation in coastal zones, marine environments and coastal wetland protection and restoration, and remote sensing (e.g., land cover classification in coastal wetlands, advection-diffusion turbidity plumes in coastal waters, delineation of bottom types and sand resources), effluent disposal and pollution of wetlands and estuaries, water resources mapping and conservation, time series studies of wetland hydroperiod and soil moisture.

International Coastal Symposium (ICS) Official Meeting of CERF

The International Coastal Symposium (ICS) was originally set up by Per Bruun (deceased) and Charlie Finkl as the official meeting of the Coastal Education and Research Foundation (CERF), with one of the first meetings being held in Hilton Head, South Carolina, in 1993. After the repeated success of these meetings, CERF moved the ICS to the international scene holding these conferences in conjunction with local sponsors in Australia, Brazil, Iceland, New Zealand, Northern Ireland, Poland, and Portugal. The ICS brings together delegates from all over the world to collaborate and discuss the most current coastal research studies and projects. During the ICS 2014, which was held in Durban, South Africa, a grand celebration took place to mark the 30th Anniversary of CERF and the JCR. Our next ICS meeting is scheduled for May of 2018 in Busan, South Korea. For more information, please visit www.cerf-jcr.org.



JOURNAL OF COASTAL RESEARCH

An International Forum for the Littoral Sciences

Supporting Scientific Institutions



- Consorzio Nazionale Interuniversitario per le Scienze del Mare (Co.N.I.S.Ma.) [Rome, Italy; www.conisma.it/]
- Delft University of Technology [Department of Hydraulic Engineering, Delft, The Netherlands; <http://www.citg.tudelft.nl/over-faculteit/afdelingen/hydraulic-engineering/>]
- Duke University [Earth and Ocean Sciences Division, Durham, North Carolina, U.S.A.; <https://nicholas.duke.edu/marinelab/>]
- Griffith University [Center for Infrastructure Engineering and Management, Southport, Queensland, Australia; <https://www.griffith.edu.au/>]
- Ibaraki University [Center for Water Environmental Studies, Mito, Japan; <http://www.cwes.ibaraki.ac.jp/>]
- International Geographical Union (IGU) [Commission on Coastal System (CCS); <http://www.igu-ccs.org/>]
- Royal Belgian Institute of Natural Sciences [Management Unit of the North Sea Mathematical Models (MUMM), Brussels, Belgium; <http://www.mumm.ac.be/EN/index.php>]
- Rutgers University [Institute of Marine and Coastal Sciences (IMCS), New Brunswick, New Jersey, U.S.A.; <http://marine.rutgers.edu/main/>]
- Universidad de la República [Marine Science Unit, Montevideo, Uruguay; <http://www.imber.info/Science/National-Network/URUGUAY/>]
- Universidade Nova de Lisboa [e-Geo Center for Geographical and Regional Planning Studies, Lisbon, Portugal; <http://e-geo.fcsh.unl.pt/>]
- University of California, Santa Cruz [Institute of Marine Sciences, Santa Cruz, California, U.S.A.; <http://ims.ucsc.edu/>]
- University of Delaware [School of Marine Science and Policy, Newark, Delaware, U.S.A.; <http://www.ocean.udel.edu/>]
- University of Maine [Climate Change Institute, Orono, Maine, U.S.A.; <http://climatechange.umaine.edu/>]
- University of Sydney [Coastal Studies Unit, Sydney, New South Wales, Australia; <http://sydney.edu.au/>]
- University of Szczecin [Institute of Marine and Coastal Science, Szczecin, Poland; <http://www.wnoz.zti.km.szczecin.pl/en/1/inom/structure/>]
- University of Ulster [Environmental Sciences Research Institute, Coleraine, Northern Ireland; <http://www.ulster.ac.uk/es/research/>]
- University of Wales, Trinity Saint David [Swansea Metropolitan University, Mount Pleasant, Swansea, South Wales, U.K.; <http://www.uwtsd.ac.uk/>]
- U.S. Army Corps of Engineers [Coastal and Hydraulics Laboratory (CHL), Vicksburg, Mississippi, U.S.A.; <http://chl.erdc.usace.army.mil/>]
- U.S. Geological Survey [National Wetlands Research Center, Lafayette, Louisiana, U.S.A.; <http://www.nwrc.usgs.gov/>]

Aims and Scope of the Journal

Journal of Coastal Research, an International Forum for the Littoral Sciences, is dedicated to all aspects of coastal research. These include geology, biology, geomorphology (physical geography), climate, littoral oceanography, hydrography, coastal hydraulics, environmental (resource) management, engineering, and remote sensing. Although each field functions effectively within its own purview, the cross-disciplinary nature of coastal studies requires familiarity with other fields as well. Hence, the scope of topics is necessarily broad in order to address the complexity of coastal biophysical and socio-economic interactions. Because of the wide range of interrelated topics, the journal invites original contributions and manuscripts dealing with theory, methodology, techniques, and field or applied topic studies on interdisciplinary coastal issues.

The journal encourages the dissemination of knowledge and understanding of the coastal zone by promoting cooperation and communication between specialists in different disciplines. Natural scientists, for example, are encouraged to collaborate with professionals in other fields to prepare contributions relating to the coastal zone that foster increased appreciation of coastal environments and processes. By means of this journal, with its scholarly and professional papers, systematic review articles, book and symposia reviews, communications and news, and special topical issues, an international forum for the development of integrated coastal research is provided.

Advertising, Editorial, and Subscription Information

Advertising and Editorial Office: All advertising and editorial correspondence should be sent to Dr. Charles W. Finkl, Editor-in-Chief, Journal of Coastal Research, 5130 NW 54th Street, Coconut Creek, FL 33073, U.S.A. PHONE: 954-899-8416. E-MAIL: cfinkl@cerf-jcr.com

Subscription Information: The *Journal of Coastal Research* is a bimonthly publication. Calendar-year (2018) print and online subscription prices for the JCR are: \$115.00 for US CERF members / \$125.00 for International CERF members (\$95.00 for online only), and \$519.00 for US institutions / \$541.00 for International institutions (\$437.00 for online only). Additional surface charges may apply to subscribers located outside of the USA. For additional membership and subscription forms and information, please go to www.CERF-JCR.org. To obtain a membership or subscription form by mail, please send request to Journal of Coastal Research, P.O. Box 7065, Lawrence, KS 66044. Back Issues and Special Issues of the JCR, when available, can be directly purchased at www.CERF-JCR.org.

The *Journal of Coastal Research* is currently surveyed in *Applied Science & Technology Abstracts*; *Applied Science & Technology Index* (H.W. Wilson); *Aquatic Sciences & Fisheries Abstracts*; *BIOBASE*; *Biological Abstracts*; *BIOSIS Previews* (Thomson); *CAB International Abstracts (CABI)*; *CSA Civil Engineering Abstracts (ProQuest)*; *Current Awareness in Biological Sciences (Elsevier)*; *Current Contents/Agriculture, Biology, & Environmental Sciences (Thomson)*; *Ecology Abstracts (ProQuest)*; *Environmental Sciences & Pollution Management*; *GeoAbstracts [Geographical Abstracts: Physical Geography; Ecological Abstracts; Geological Abstracts; GEOBASE] (Elsevier)*; *GeoRef*; *Meteorological & Geostrophysical Abstracts (ProQuest)*; *Oceanic Abstracts (ProQuest)*; *Oceanographic Literature Review (Elsevier)*; *Physical Sciences Digest (CSA, Ebsco)*; *Pollution Abstracts (ProQuest)*; *Referativnyi Zhurnal*; *Science Citation Index; SciSearch (Thomson)*; *SCOPUS*; *Water Resources Abstracts (Bethesda)*; *Zoological Record (Thomson)*.

JCR – SI85

Proceedings of the 15th International Coastal symposium
ICS2018

Haeundae, Busan, Republic of Korea
13th – 18th May 2018

Volume 1

Edited by :

Jae-Seol Shim¹, Insik Chun², and Hak Soo Lim¹

¹Operational Oceanography Research Center, Korea Institute of Ocean Science and Technology

²Department of Civil Engineering, Konkuk University

Journal of Coastal Research Special Issue No. 85

The 15th International Coastal Symposium 2018

Haeundae, Busan, Republic of Korea

13th – 18th May 2018

Local Organising Committee

Jae Seol Shim, Chairman, Principal Research Scientist of KIOST, Korea
Insik Chun, Co-Chairman, Professor of Konkuk University, Korea
Hak Soo Lim, Vice Chairman (Secretary), Principal Research Scientist of KIOST, Korea
O Soon Kwon, Coastal Disaster Prevention Center, Korea Institute of Ocean Science & Technology(KIOST), Korea
Youngmin Oh, Coastal Development Research Center, Korea Institute of Ocean Science & Technology (KIOST), Korea
Sungwon Shin, Department of Marine Science and Convergence Engineering, Hanyang University, Korea
Dong Hyawn Kim, Department of Ocean Science & Engineering, Kunsan National University, Korea
Jong Joo Yoon, Division of Climate Change Response, ChungNam Institute, Korea
Seung Woo Kim, Risk Solutions Co., Korea
Haegyun Lee, Department of Civil and Environmental Engineering, Dankook University, Korea
JeongIn Chang, Korea Maritime Institute, Korea
Sangyoung Son, School of Civil, Environmental and Architectural Engineering, Korea University, Korea
In Sung Jang, Underwater Construction Robotics R&D Center, Korea Institute of Ocean Science & Technology(KIOST), Korea
Chang Hwan Ji, Research Fellow, BDI (Busan Development Institute), Korea
Jaehwa Chung, Department of Computer Science, Korea National Open University (KNOU), Korea
Chan Su Yang, Operational Oceanography Research Center, Korea Institute of Ocean Science & Technology (KIOST), Korea
Hyoseob Kim, Department of Civil and Environmental Engineering, Kookmin University, Korea
Young Bok Kim, Vice Chairman, Korea Ports and Harbours Association 707 World Meridian Biz Center, Korea
Chan Hong Park, Dokdo Research Center, Korea Institute of Ocean Science and Technology (KIOST), Korea
Dongsung Kim, Marine Ecosystem and Biological Research Center, Korea Institute of Ocean Science & Technology (KIOST), Korea
Kyu Nam Hwang, Department of Civil Engineer, Chonbuk National University, Korea
Sang Ho Oh, Coastal Development Research Center, Korea Institute of Ocean Science & Technology (KIOST), Korea
Jooyong Lee, Construction and Environmental Research Center, Sungkyunkwan University, Korea
Dong Seob Song, Department of Earth and Environmental Engineering, Kangwon National University (KNU), Korea
Jang ho Hong, Infrastructure Business Division, Halla, Korea
Jin Seok Ko, Headquarter, HYEIN E&C Co. Ltd., Korea
Yang Su Kim, Executive Director, SK E&C, Korea
Doo Hong Kim, General Manager, GS E&C, Korea
Tae Soon Kang, GeoSystem Research Corp., Korea
Dong Chule Kim, Research and Development Institute, HYEIN E&C Co. Ltd., Korea

International Advisory Committee

Charles W Finkl, President & Executive Director, CERF
Chris Makowski, Vice President & Assistant Director, CERF

International Scientific Board

Allen Gontz	Dongsung Kim	Jeong Won Kang	Norbert P. Psuty
Anja Scheffers	Haegyun Lee	Jeongin Chang	Ok Hwan YU
Carlos Pereira da Silva	Hak Soo Lim	Jong Joo Yoon	Oscar Maunel Ferreira
Chang Hwan Ji	Hee Jun Lee	Joo Young Lee	O Soon Kwon
Chan Su Yang	Hong Yeon Cho	Julian Orford	Sangyoung Son
Charitha B. Pattiaratchi	Hyoseob Kim	Jung Jin Oh	Seung Woo Kim
Cheol Ho Kim	Hyun Han Kwon	Kyu Nam Hwang	Sung Won Shin
Daekyo Cheong	Insik Chun	Lindino Benedet	Tanaka Hitoshi
Dong Soo Hur	Jae Seol Shim	Michael Hilton	Tom Spencer
Donghun Kim	Javier Diez	Nathaniel Plant	Wenrui Huang
			Won Chul Jo
			Young Min Oh

ISSN 0749-0208

Front and back cover photos: Hak Soo Lim (Korea Institute of Ocean Science & Technology)

Published by

Korea Institute of Ocean Science and Technology (KIOST)
<http://www.kiost.ac.kr>

Korean Society of Coastal Disaster Prevention (KSCDP)
<http://www.kscdp.or.kr>

All the authors are responsible for the contents of their papers. KIOST, KSCDP and CERF can not be held responsible for any opinions and statements made by them.

TABLE OF CONTENTS

VOLUME 1

RIVERS AND ESTUARIES

Sedimentary Processes of Barrier-Lagoon System in the Nakdong River Estuary, Busan, South Korea Han Jun Woo, Jun-Ho Lee, Jeongwon Kang, and Jae Ung Choi	01
Seasonally Hypersaline Estuaries in Semiarid Climate Regions: an Example from the Northeast Brazil S. S. Valentim, M.O. B. Menezes, and C. E. P. Teixeira	06
The Modelling Approach for Predicting Coastal Pollutions using Rainfall Distributions over Different Land Use/Land Cover Hun-Kyun Bae	11
On the Response of Shallow-water Tidal Regime by Geological Characteristic of Waterway and Man-made Structures in a Macrotidal Estuary: Han River Estuary (Korea) Byung Il Yoon and Seung-Buhm Woo	16
Influence of Kuroshio Path on Salinity Distribution in Seto Inland Sea Shinya Nakashita, Heeun Woo, Kyeongmin Kim, Kyunghoi Kim, In-Cheol Lee, Dong-Sun Kim, and Tadashi Hibino	21
Monitoring of the Changjiang River Plume in the East China Sea using a Wave Glider Taejun Moh, Jin Hyung Cho, Seom-Kyu Jung, Sang-Hyun Kim, and Young Baek Son	26
Modeling the Processes that Control Fine Sediments Transport in the Río de la Plata Estuary Claudia G. Simionato and Diego Moreira	31
Elemental (C/N Ratios) Isotope Compositions ($\delta^{13}\text{CTOC}$ and $\delta^{15}\text{NTN}$) of Surface Sediments from the Barrier Islands in the Nakdong River Estuary, South Korea Jun-Ho Lee, Kap-Sik Jeong, Dong-Hun Lee, Kap Song Park, and Han Jun Woo	36
Spatio-temporal Changes of Sediment Environment in the Taehwa River Estuary, Ulsan of Korea Bo-Ram Sim, Hyung Chul Kim, Chung-Sook Kim, Dong-Woon Hwang, Jung-Hyun Park, Yoon-Sik Cho, Sokjin Hong, and Won-Chan Lee	41
The Monitoring of Topography Change in the Estuary of the Korean East Coast Using LiDAR Sungduk Kim, Hojin Lee, Kyewon Jun, and Byong-Hee Jun	46
Bathymetry Estimation by Orbital Data of OLI Sensor: A Case Study of the Rio Grande Harbor, Southern Brazil Deivid Cristian Leal Alves, Jean Marcel de Almeida Espinoza, Miguel da Guia Albuquerque, Marine Bastos da Silva, José Scott Fontoura, Christian Serpa, and Jair Weschenfelder	51
On the Inverse Relationship between Concentration and Size of Cohesive Sediment Minwoo Son, Fabián A. Bombardelli, Byeoungeun Park, and Jisun Byun	56
Investigation of the River Mouth Topography Change by the Response Characteristics of River Discharge and Ocean Waves at Yoneshiro River Kazuya Watanabe and Kohei Kumagai	61
Integrated High-resolution Numerical Model for the NW Iberian Peninsula Coast and Main Estuarine Systems Magda C. Sousa, Américo S. Ribeiro, Marisela Des, Renato Mendes, Ines Alvarez, Moncho Gomez-Gesteira, and João M. Dias	66
3-D Numerical Investigation on Effect of Flow Structure and Water Level on Vegetation Distribution in an Open Channel Ho Seong Jeon, Dong Soo Hur, Jong Ryul Park, Jong Sung Yoon, In Ho Kim, and Woo Dong Lee	71
The Influence Of Seasonality On Haline Zones In An Amazonian Estuary Micaela Valentim, Sury Monteiro, and Marcelo Rollnic	76
Influence of tide on salt entrapment in the River Mojuim Estuary Mauricio S. Costa, Adriano S. Rocha, Arthur S. Santos, and Marcelo Rollnic	81
Analysis of Physical Habitat Change for Target Fish Induced by Extended Floodplain Il Hong, Ji sung Kim, Kyu Ho Kim, Hyoung Sub Shin, and Ho Seong Jeon	86
Sedimentological Sectorization Model In An Amazonian Estuary Herbert Junior Campos Peixoto, Lizandra Pantoja Baia, Débora Rodrigues Pereira, Marcelo Rollnic, and Sury de Moura Monteiro	91
Evaluation of Mixing and Stratification in an Estuary of Korea Nam-Hoon Kim, Jin Hwan Hwang, and Dong Hyeon, Kim	96
Using Geostationary Ocean Color Imager to Map the Diurnal Dynamics of Suspended Sediment Concentration in Estuary Area Yanyan Kang, Xianrong Ding, and Xiaoping Ge	101

Lattice Boltzmann Simulation of Shallow Water Equations in Finite Element Framework Haegyun Lee and Namjoo Lee	106
Seasonal Exchanges of Salt and Suspended Particulates between the Sol Bay and the Pará River, Amazonian Coast Angela C. Cidon Mascarenhas, Arthur W. Ramos Correa, Adriel G. Carneiro, Maurício S. Costa, Marcelo Rollnic, and Carmen Medeiros	111
3-D Simulation of the Suspended Sediment Transport in the Jiao Jiang Estuary: Based on Validating by Remote Sensing Retrieval Cuizhuo Lu, Huan Li, Weiqi Dai, Jianfeng Tao, Fan Xu, Stephanie Cybele, Xiaoyan Zhang, and Hongtao Guo	116
Tide influence on suspended matter transport in an Amazonian Estuary Marcelo Rollnic, Maurício S. Costa, Paula R. L. Medeiros, and Sury M. Monteiro	121
Plume Current Change by Seawall Construction for a Harbor Development in South Korea Moon-Jin Kim, Chang-Soo Kim, Byoung-Ju Choi, and Sang-Ho Lee	126
Erosion Problem on a Fluvial Beach. The Case Study of “La Concordia” in the Uruguay River, Uruguay, South America Rodrigo Alonso, Sebastián Solari, and Luis Teixeira	131

TIDAL INLETS

An Investigation of the Mixing and Exchange Characteristics in Tidal Channels of Radial Sand Ridges in the South Yellow Sea, China Jing Yao and Jianfeng Tao	136
The Influence of Wind on Hydrodynamic Processes in Robbins Passage, Tasmania, Australia Cuong Q. Nguyen, Ian D. Goodwin, Thomas R. Mortlock, and Shari L. Gallop	141
Bar Migrations on a Macrotidal Ebb Delta over a Period of Six Years Using Lidar Survey Xavier Pellerin Le Bas and Franck Levoy	146
Revisiting the Relationship between Tidal Asymmetry and Basin Morphology: A Comparison between 1D and 2D Models Zeng Zhou, Luying Chen, Ian Townend, Giovanni Coco, Carl Friedrichs, and Changkuan Zhang	151
A New Method for Automatic Definition of Tidal Creek Networks Liang Geng, Zheng Gong, Stefano Lanzoni, and Andrea D'Alpaos	156
Investigating the Stability of Double-Inlet Tidal Systems Using a Process-Based Modelling Approach Ali Dastgheib, Ayu S. R. Wulandari, and Roshanka Ranasinghe	161

DUNES, BEACHES AND COASTS

Modelling the Retreat of a Coastal Dune under Changing Winds Sylvain Gabarrou, Gonéri Le Cozannet, Eric J.R. Parteli, Rodrigo Pedreros, Etienne Guerber, Bastien Millescamp, Cyril Mallet, and Carlos Oliveros	166
Analysis of Beach Recovery After the 2011 Tohoku Earthquake Tsunami Based on Shoreline Extraction by ISODATA Kaoru Tojo and Keiko Udo	171
Assessment of UAV Photogrammetric Mapping Accuracy in the Beach Environment Euiyoung Jeong, Jun-Yong Park, and Chang-Su Hwang	176
Cliff Retreat Induced by Series of Storms at Międzyzdroje (Poland) Paweł Terefenko, Andrzej Giza, Dominik Paprotny, Adam Kubicki, and Marcin Winowski	181
Efficient Real-time Erosion Early Warning System and Artificial Sand Dune Breaching on Haeundae Beach, Korea Jin-Su Seok and Seung-Won Suh	186
How Observed Kilometric Sandy Shoreline Undulations depend on Wave Climate Déborah Idier, Albert Falqués, Manuel Garcin, and Jérémy Rohmer	191
Numerical Simulation and Large-Scale Physical Modelling of Coastal Sand Dune Erosion Kideok Do, Sungwon Shin, Daniel Cox, and Jeseon Yoo	196
Hindcast of Long-term Shoreline Change due to Coastal Interventions at Namhangjin, Korea Yeon S. Chang, Bas Huisman, Wiebe de Boer, and Jeseon Yoo	201
Dynamics of Surface Moisture Content on a Macro-tidal Beach Anne-Lise Montreuil, Margaret Chen, Evelien Brand, Glenn Strypsteen, Pieter Rauwoens, Annelies Vandenbulcke, Alain De Wulf, Sebastian Dan, and Toon Verwaest	206
In-Situ Observations of Mudbanks of Southwest Coast of India and Mapping of its Extent in 2016 S Santhosh Kumar and R Mani Murali	211

The Variations of Sediment Transport Patterns in the Radial Sand Ridges along the Jiangsu Coast, China over the Last 30 Years Jianfeng Tao, Fan Xu, Peng Yao, Zeng Zhou, and Changkuan Zhang	216
UAS & SfM-based approach to Monitor Overwash Dynamics and Beach Evolution in a Sandy Spit Lara Talavera, Laura del Río, Javier Benavente, Luis Barbero, and Juan Antonio López-Ramírez	221
UAV Derived Information Applied to the Study of Slow-changing Morphology in Dune Systems Ana Pestana Bastos, Cristina Ponte Lira, João Calvão, João Catalão, César Andrade, Ana Júlia Pereira, Rui Taborda, Daniela Rato, Pedro Pinho, and Otília Correia	226
Characteristics of Systematic Migrations of Multiple Sandbars and Related Cross-Shore Sediment Transport at Chirihama and Adjacent Coasts, Japan Masatoshi Yuhi and Shinya Umeda	231
UAV Photogrammetry for Elevation Monitoring of Intertidal Mudflats Weiqi Dai, Huan Li, Zeng Zhou, Stephanie Cybele, Cuizhuo Lu, Kun Zhao, Xiaoyan Zhang, Huatao Yang, and Dingyuan Li	236
Bed Shear Stress Estimation Under Wave Conditions Using near-bottom Measurements: Comparison of Methods Qian Zhang, Zheng Gong, Changkuan Zhang, Jessica R. Lacy, Bruce E. Jaffe, and Beibei Xu	241
Megaripple/Flat Bed Transition in Rip Current Channels Douglas J. Sherman	246
Non-Equilibrium Suspended Sediment Transport on the Intertidal Flats of Jiangsu Coast, China Beibei Xu, Zheng Gong, Qian Zhang, Changkuan Zhang, and Kun Zhao	251
Verification of Beach Erosion in West Coast of Korea Young Bok Lee, Hyun Dong Kim, and Kisu Kwak	256
Seasonal to Decadal Variability of Shoreline Position on a Multiple Sandbar Beach Shinya Umeda, Masatoshi Yuhi, and Harshinie Karunarathna	261
Characterization of Maritime Storms and Analysis of their Effect on the Beaches South of the Mondego River (Portugal) Maria Inês Santos, Filipa S. B. F. Oliveira, and António Trigo-Teixeira	266
Critical Depths Derived for Three Distinct Modes of Coastal Sediment Transport HongYuan Shi, Zai-Jin You, BaoShu Yin, and YuChuan Bai	271
UAV monitoring of 3-year Foredune Partial Recovery from a severe Winter: Truc Vert Beach, SW France Benoît Guillot, Bruno Castelle, Vincent Marieu, Stéphane Bujan, and David Rosebery	276
The Application of X-Band Radar for Characterization of Nearshore Dynamics on a Mixed Sand and Gravel Beach John Atkinson, Luciana S. Esteves, Jon W. Williams, David L. McCann, and Paul S. Bell	281
Estimates of Sediment Pickup Rate induced by Surge Wave within a Multi-level Bayesian Regression Framework Seokil Jeong, Hyun-Han Kwon, and Seung Oh Lee	286
Feasibility of Elevation Mapping in Muddy Tidal Flats by Remotely Sensed Moisture (RSM) Method Huan Li, Zheng Gong, Weiqi Dai, Cuizhuo Lu, Xiaoyan Zhang, Stephanie Cybele, and Hongtao Guo	291
Observations of Surface and Subsurface Processes on a Saltmarsh in the Central Jiangsu Coast (China) Chuang Jin, Zheng Gong, Liang Geng, Kun Zhao, Beibei Xu, and Giovanni Coco	296
Analysis of Wind Field over an Artificial Straight Dune by LES Simulations Tsukasa Kuribayashi and Keiko Udo	301
Longitudinal distribution of slope and sediment characteristics in headland-bay beaches in Cádiz, Spain Silvia Rodríguez-Polo, Laura Del Río, and Javier Benavente	306
The Role of Local Geomorphology Influencing Coastal Response to Sea Level Rise Walkiria S. Olsen, Salette A. Figueiredo, Miguel da Guia Albuquerque, and Lauro J. Calliari	311

COASTAL BIOLOGY AND ECOLOGY

Is Citizen Science a Valid Tool to Monitor the Occurrence of Jellyfish? The Spot the Jellyfish Case Study from the Maltese Islands Marija Pia Gatt, Alan Deidun, Anthony Galea, and Adam Gauci	316
Effects of Abalone Farming Cage Removal on the Benthic Foraminiferal Assemblages Jae Ung Choi, Yeon Gyu Lee, Da Un Jeong, Yang Ho Choi, and Han Jun Woo	321
A New and Effective Transplanting Technique Using Wire Netting for Restoration of the Surfgrass, <i>Phyllospadix japonicus</i>, in Exposed Rocky Shores Jung-Im Park, Jong-Hyeob Kim, Jae Hoon Kim, and Jeong Hee Shim	326

Monthly Variations in the Intracellular Nutrient Pools of Phytoplankton in Jaran Bay, Korea Jae Hyung Lee, Hyung Chul Kim, Taehee Lee, Won Chan Lee, Jae Joong Kang, Naeun Jo, Dabin Lee, Kwan Woo Kim, Jun-Oh Min, Sungchan Kang, and Sang Heon Lee	331
Inter-Annual Variation of the Annual New Production of Phytoplankton in the Southwestern East/Japan Sea Estimated from Satellite-Derived Surface Nitrate Concentration HuiTae Joo, Dabin Lee, Jae Joong Kang, Jae Hyung Lee, Jin-Yong Jeong, Seung-Hyun Son, Jae-Il Kwon, and Sang Heon Lee	336
Mixed Aquaculture of <i>Anadara broughtonii</i> and <i>A. kagoshimensis</i> (Bivalvia: Arcidae) in Jinju Bay on the South Coast of the Korean Peninsula Jeong Bae Kim, Hyung Chul Kim, Sokjin Hong, and Jung-Im Park	341
Diet Composition and Feeding Habits of Two Engraulid Fish Larvae (<i>Engraulis Japonicus</i> and <i>Coilia Nasus</i>) in the Nakdong River Estuary, Korea Hee Chan Choi, Seok Hyun Youn, Sung-Hoi Huh, and Joo Myun Park	346
Ecological Characteristics of the New Recorded Seahorse (<i>Hippocampus haema</i>) in Geoje-Hansan Bay, Korea Myung Joon Kim, Hyung Chul Kim, Won Chan Lee, Joo Myun Park, Seok Nam Kwak, Younggeun Oh, Min Gu Kang, and Sang Heon Lee	351
Monthly Variations of Phytoplankton Community in Geoje-Hansan Bay of the Southern Part of Korea Based on HPLC Pigment Analysis Jae Joong Kang, Jae Hyung Lee, Hyung Chul Kim, Won Chan Lee, Dabin Lee, Naeun Jo, Jun-Oh Min, and Sang Heon Lee	356
Response of Intertidal Meiofaunal Communities to Heavy Metal Contamination in Laboratory Microcosm Experiments Teawook Kang, Je Hyeok Oh, Jae-Sang Hong, and Dongsung Kim	361
Relating Coastal Geomorphology to Marine Benthic Biodiversity Kristjan Herkül, Robert Aps, Külli Lokko, Anneliis Peterson, and Hannes Tõnisson	366
Carbohydrate-dominant Phytoplankton and Protein-high Zooplankton in the Northern Part of the Southwestern East/Japan Sea in 2015 Naeun Jo, Jae Joong Kang, Won Gyu Park, Bo Ram Lee, Jae Hyung Lee, Yewon Kim, So Hyun Ahn, Dabin Lee, Jun-Oh Min, Chang-Keun Kang, and Sang Heon Lee	371
Modeling Coastal Benthic Biodiversity Using Georeferenced Environmental Data: Mapping Present and Predicting Future Changes Anneliis Peterson, Kristjan Herkül, and Kaire Torn	376
Palynological and Geochemical Records of Environmental Changes in a Taxodium Swamp near Lake Pontchartrain in Southern Louisiana (USA) during the Last 150 Years Junghyung Ryu, Thomas A. Bianchette, Kam-biu Liu, Qiang Yao, and Kanchan D. Maiti	381
Feeding Patterns of 'Finless Porpoise (<i>Neophocaena asiaeorientalis</i>)' in the Yellow Sea as Indicated by Stable Carbon and Nitrogen Isotope Ratios Younggeun Oh, Hawsun Sohn, Dasom Lee, Yong-Rock An, Chang-Keun Kang, Min Gu Kang, and Sang Heon Lee	386
Construction of Climate Change-Adapted Seaweed Beds on the Japanese Coast Hiroshi Miura, Yasushi Ito, and Yoshihiro Suenaga	391
Implications of Estuarine and Coastal Management in the Growth of <i>Porphyra</i> sp. in the Geum River Estuary, South Korea: A Modeling Study Hae-Cheol Kim, Yong-Sik Song, Yong Hoon Kim, Seunghyun Son, Jae-Gab Cho, Won Keun Chang, Chang-Hee Lee, Jungho Nam, and Jongseong Ryu	396
The Community Structure and Grazing Rates of Meiobenthos in Chunsu Bay, West Coast of Korea Won-Gi Min, Kae-Kyoung Kwon, Hyun Soo Rho, and Dongsung Kim	401

COASTAL GEOLOGY

Dominance of Inherited Geologic Framework on the Development of Coastal Barrier System Julie Billy, Nicolas Robin, Christopher Hein, Duncan FitzGerald, and Raphaël Certain	406
Circular Sedimentary Figures of Anthropic Origin in a Sediment Stability Context Thierry Garlan, Xavier Mathias, Emeric Brenon, Nathalie Favretto-Cristini, Anne Deschamps, Eric Beucler, Patrick Guyomard, and Olivier Morio	411
Erodibility of Sand-Mud Mixed Sediment on the Yeochari Tidal Flat, Gyeonggi Bay, Korea Hun Jun Ha, Sun Min Cho, Jun Young Seo, and Ho Kyung Ha	416
Biological Mediation of Sediment Erosion: Can We Account for Tidal Effects? Xindi Chen, Jie Wang, Changkuan Zhang, Shibai Yu, Jingjing Zhou, Naiyu Zhang, and Qian Feng	421

The Effects of Nourishments Using the Grain-Size Trend Analysis on the Intertidal Zone at a Sandy Macrotidal Beach Tae-Jin Choi, Jin-Yong Choi, Jun-Yong Park, Han-Yong Um, and Jung-Hoon Choi	426
Fate of dissolved trace metals in the waters of Bahia Magdalena lagoon, Baja California Sur, México S.B. Sujitha, M.P. Jonathan, D.C. Escobedo-Urias, Fernando Aguirre-Bahena, S. K. Sarkar, Lorena Elizabeth Campos Villegas, and E. González Gomez	431
Wind waves and cliff shaking on macrotidal shore platforms: A case-study from North Yorkshire, U.K David M. Kennedy, Emma C. Vann Jones, Mark E. Dickson, and Nick J. Rosser	436
Experimental Investigation of the Effects of Revetments on Seawater Intrusion in Coastal Aquifers Woo Dong Lee, Young Jae Yoo, Yeon Myeong Jeong, Yeong Han Jeong, and Dong Soo Hur	441
Diachronic Condition Between Maximum Transgressive and Maximum Eustatic Sea-Level in Holocene: Subsidies for Coastal Management Eduardo G. Barboza, Maria Luíza C.C. Rosa, Sérgio R. Dillenburg, Débora S.Z. Watanabe, Tayná Esteves, Eduardo M. Martins, and Nelson L.S. Gruber	446
Dynamics of Sediment Resuspension in the Inner Harbor Under Different Forcing Conditions: A Case Study of Ulsan, Korea Ho Kyung Ha, Jun Young Seo, Yoon Ho Jung, Hun Jun Ha, Soo Bin Kim, Ji Won Kang, Yong Hoon Kim, and Jongseong Ryu	451
Numerical Model of Geochronological Tracers for Deposition and Reworking Applied to the Mississippi Subaqueous Delta Justin J. Birchler, Courtney K. Harris, Tara A. Kniskern, and Christopher R. Sherwood	456

CONTINENTAL SHELVES AND SLOPES

Experimental Generation of Solitary Waves by a Thin Bump Traveling on Sea Bed Sang-Ho Oh, Dal Soo Lee, and Jeongwhan Choi	461
Comparison of Internal Waves in Various Ocean Fields Around the Korean Peninsula Hyuna Kim, Young Baek Son, Jin-Yong Jeong, and Young-Heon Jo	466
Seasonal Variations and Long-term Trends of the Coastal Upwelling along the Southwestern Coast of the East Sea/Japan Sea Chang-Woong Shin, Dong Guk Kim, and Chan Joo Jang	471
Turbulent mixing induced by Cold Water Intrusion over the Southwestern East Sea Seongbong Seo, Young-Gyu Park, Chanhung Jeon, Hong Sik Min, Dong Guk Kim, and Jae-Hun Park	476
Possible Presence of Shear Instabilities at Steep Slopes during an Upwelling Event in the Gulf of Finland, Baltic Sea Nicole Delpeche-Ellmann and Tarmo Soomere	481
Behavior of Diurnal Internal Waves in the Southwestern East/Japan Sea Jeong-Yeob Chae, Chanhung Jeon, Sung Jin Park, and Jae-Hun Park	486

CORAL REEFS

Physical Modelling of Reef Platform Hydrodynamics Megan E. Tuck, Murray R. Ford, Gerd Masselink, and Paul S. Kench	491
Understanding Interactions between Shoreline Changes and Reef Outer Slope Morphometry on Takapoto Atoll (French Polynesia) Antoine Collin, Virginie Duvat, Valentin Pillet, Bernard Salvat, and Dorothée James	496
Modelling Wave Breaking across Coral Reefs Using a Non-Hydrostatic Model Jian Shi, Chi Zhang, Jinhai Zheng, Chaofeng Tong, Peng Wang, and Songgui Chen	501

CLIMATE AND SEA LEVEL CHANGE

Action Strategy for Studying Marine and Coastal Works with Climate Change on the Horizon Vicente Negro, José Santos López-Gutiérrez, María Dolores Esteban, José María del Campo, and Jorge Luengo	506
Modelling the Response of Atoll Reef Islands to Multi-Millennial Sea Level Rise from the Last Glacial Maximum to the Coming 10kyr: the Case of Mururoa Atoll (Tuamotu, French Polynesia) Gonéri Le Cozannet, Virginie Duvat, Bernard Salvat, Samuel Etienne, Heitea Terorotua, Manuel Garcin, Sophie Lecacheux, and Lucien Montaggioni	511

Improved Hypothetical Typhoon Generation Technique for Storm Surge Frequency Analyses on the Southwest Korean Coast Hyeon-Jeong Kim, Seung-Won Suh	516
Climate Change Effects on Suspended Sediment Dynamics in a Coastal Lagoon: Ria de Aveiro (Portugal) Sandra Costa, Ana Picado, Nuno Vaz, Carlos Coelho, Luís Portela, and João Miguel Dias	521
Improvement of Decomposing Results of Empirical Mode Decomposition and its Variations for Sea-level Records Analysis Han Soo Lee	526
An Inventory of Historic Storms and Cyclone Tracks That Have Caused Met-Ocean and Coastal Risks in the Eastern Baltic Sea Ülo Suursaar, Mait Sepp, Piia Post, and Martin Mäll	531
A Bayesian Quantile Regression Approach for Nonstationary Frequency Analysis of Annual Maximum Sea Level in a Changing Climate Sumiya Uranchimeg, Jang-Gyeong Kim, Jin-Guk Kim, Hyun-Han Kwon, and Seung Oh Lee	536
Projections of Future Beach Loss due to Sea Level Rise for Sandy Beaches along Thailand's Coastlines Sompratana Ritphring, Chatuphorn Somphong, Keiko Udo, and So Kazama	541
A Numerical Simulation of Long-Term Sea Level Change in the East Asian Marginal Seas Cheol-Ho Kim, Chan Joo Jang, and Min-Woo Kim	546
Application of SLOSH in Estimation of Typhoon-induced Storm Surges in the Coastal Region of South Korea Jinsung Seo, Hyeyun Ku, Kwangwoo Cho, Jun Ho Maeng, and Haemi Lee	551
Automatic Mapping Technique of Sea Ice in the Coastal Waters of the Arctic Ocean Using Sentinel-1 Data Dan-Bee Hong, Jeong-Ju Bae, and Chan-Su Yang	556
Voyage Environmental Information System (VEIS) for Safe Navigation Support in the Coastal Waters of the Arctic Ocean Chan-Su Yang, Kyeong Ok Kim, Hak Soo Lim, Cheol-Ho Kim, Min-Woo Kim, and Dan-Bee Hong	561
A Bivariate Frequency Analysis of Extreme Wave Heights and Periods Using a Copula Function in South Korea Yong-Tak Kim, Jong-Hyeon Park, Byoung-Han Choi, and Hyun-Han Kwon	566
Enhancement of Wave Radar Observation Data Quality at the Socheongcho Ocean Research Station Yongchim Min, Jin-Yong Jeong, In-Ki Min, Yong Sun Kim, Jae-Seol Shim, and Kideok Do	571
Daily to Seasonal Variability of the Mixed Layer Depth in the Central Yellow Sea: Effects of Atmospheric Forcing Yong Sun Kim, Chan Joo Jang, Jin-Yong Jeong, and Jae-Seol Shim	576
Non-seasonal Sea Level Variations in the Korea Strait and Regional Atmospheric Conditions Jong-Kyu Kim, Byoung-Ju Choi, and Sang-Ho Lee	581
Non-stationary Modeling of Trends in Extreme Water Level Changes Along the Baltic Sea Coast Nadezhda Kudryavtseva, Katri Pindsoo, and Tarmo Soomere	586
Future Changes in the Sea Surface Wind over the East Asian Marginal Seas Projected by Regional Climate Models Chan Joo Jang, Wonkeun Choi, Ho-Jeong Shin, and Cheol-Ho Kim	591

COASTLINE AND ESTUARINE EVOLUTION

Numerical Analysis of Beach Erosion at Jeongdongjin Beach in South Korea Using Field Survey and Measurement Data Hyeong Jun Kim, Sang Min Cho, and Won Chul Cho	596
Coastline Change Measurement Using Shipborne Mobile LiDAR in Anmok Beach, Gangneung, Korea Chang Hwan Kim, Hyun Wook Kim, Chan Hong Park, Won Hyuck Kim, Myoung Hoon Lee, Soon Young Choi, and Jong Dae Do	601
Numerical Simulation of Fortnightly Modulations of the Convergence Zone by Residual Volume Transport in a Macrotidal Estuary Seung-Buhm Woo and Byung Il Yoon	606
Rhythmic Patterns of Coastal Formations as Signs of Past Climate Fluctuations on Uplifting Coasts of Estonia, the Baltic Sea H. Tõnisson, Ü. Suursaar, A. Kont, M. Muru, R. Rivas, A. Rosentau, T. Tamura, and K. Vilumaa	611
Quaternary Hydrodynamic Contexts of the Emerging Coasts of Nunavik (Northern Québec, Canada) Antoine Boisson and Michel Allard	616
Theory for Erosion Wave Propagation in Cua Dai Beach, Vietnam Hitoshi Tanaka, Dinh Van Duy, Yuta Mitobe, and Nguyen Trung Viet	621
Study of Holocene paleo-environmental evolution using cores from the downstream area of the Nakdong River Delta, Korea Eun Je Jeong, Han Jun Woo, Jeongwon Kang, Jun-Ho Lee, and Jae Ung Choi	626
Shoreline Planform Stability of Embayed Beaches Along the Malaysian Peninsular Coast Mohd Shahrizal Ab Razak, Franciscus Xavierius Suryadi, Nurhamizah Jamaluddin, and Nur Ariffah Zaimah Mohd Nor	631

Assessing Future Coastline Change in the Vicinity of Tidal Inlets via Reduced Complexity Modelling Janaka Bamunawala, Roshanka Ranasinghe, Ad van der Spek, Shreedhar Maskey, and Keiko Udo	636
Parallel Morphodynamic Modelling for the Yangtze Estuary Ao Chu, Zhengbing Wang, H. J de Vriend, and Jiaai Tai	641
Towards Assessing the Resilience of Complex Coastal Systems: Examples from Ria Formosa (South Portugal) Katerina Kombiadou, Ana Matias, Rita Carrasco, Óscar Ferreira, Susana Costas, and Gustavo Vieira	646
Process Control in The Geneses and Evolution of A Lagoon-Barrier System inside of The Patos Lagoon, South of Brazil Rogério Portantiolo Manzolli, Luana Portz, Volney Junior Borges de Bitencourt, Renato Amabile Leal, Eduardo Marques Martins, Anderson Biancini da Silva, Eduardo Guimarães Barboza, Felipe Caron, Javier Alcantará Carrió, and Andre Oliveira Sawakuchi	651
Characterizing the Longshore Sediment Transport Pattern on Beaches in the Gulf of Arauco, Chile, to Assess Morphological Shoreline Evolution Matías Gómez, Mauricio Villagrán, Carolina Martínez, and Arturo Belmonte	656
Adaptability of Suspended Sediment Transport Model for Sandbar Migration Simulation Dae-Hong Kim, Boram Kim, and Byunghan Choi	661
Towards the Development of a Storm Erosion EWS for the French Aquitaine Coast Alexandre Nicolae Lerma, Thomas Bulteau, Héloïse Muller, Clément Decarsin, Raphael Gillet, François Paris, Mélanie Biauxque, Nadia Senechal, and Bruno Castelle	666
Paleodrainage Systems and Connections to the Southern Lacustrine Belt applying Remote Sensing Data, Amazon Coast, Brazil. Kerly Araújo Jardim, Valdenira Ferreira dos Santos, and Ulisses Rocha de Oliveira	671

BLUE CARBON

Modelling Saltmarsh Spatial Evolution at High Resolution from 1948 to 2100 (Beaussais's Bay, France) Rachel E. Bitoun, Antoine Collin, Dorothée James, and Sylvain Pioch	676
Insights into Macroinvertebrate burrowing Activity and Methane Flux in Tidal Flats Jeongwon Kang, Bon Joo Koo, Kap-Sik Jeong, Han Jun Woo, Jaehwan Seo, Min-Seob Kim and Kaekyoung Kwon	681

COASTAL HAZARDS

Variability of Wave-induced Current Analyzed with Intensive Field Measurements in the Coastal Waters of Anmok Hak Soo Lim, Mujong Kim, Jong-Dae Do, Sun-Sin Kim, Hee Jun Lee, and Dong Ho Kim	686
Incorporating Tidal Uncertainty into the Methodology of Probabilistic Tsunami Hazard Analysis En-Chi Wu, Yen-Lung Chen, Han-Lun Wu, Kai-Cheng Hu, Shih-Chun Hsiao, and Yuan-Chieh Wu	691
Detection of Coastal Damage using Differences in Automatically Generated Digital Surface Models (DSMs): Application to the 2011 Off the Pacific Coast of Tohoku Earthquake Tsunami Keiko Udo, Yuriko Takeda, and Shunichi Koshimura	696
Influences of Earthquake Characteristics on Seismic Performance of Anchored Sheet Pile Quay with Barrette Piles Fumao Chen, Huiming Tan, Jia Chen, and Zhibin Jiao	701
Developing a Prediction System for the Invasion of Swell-like Waves on the Southern Coast of Korea Jung Lyul Lee, Jung Won Kim, Hyun Seung Kim, Won Chul Cho, and Jooyong Lee	706
Simulation of Wave Overtopping and Inundation over a Dike Caused by Typhoon Chaba at Marine City, Busan, Korea Seung-Won Suh and Hyeon-Jeong Kim	711
An Explosively Developing Extratropical Cyclone Associated with the High Wind-Waves along the East Coast of Korea Ki-Young Heo, Jin-Yong Choi, Kwang-Soon Park, Jae-Il Kwon, In-Ki Min, and Taemin Ha	716
A Database of Recent Historical Storm Impact on the French Basque Coast Stéphane Abadie, Marion Beauvivre, Estelle. Egurrola, Christine Bouisset, Isabelle Degremont, and Florian Arnoux	721
Generation of a New Tsunami Hazard Map for the Port of Imwon Seung Oh Lee, Won-Jin Kim, and Yong-Sik Cho	726
Run-up Heights of Tsunamis for Geometric Variables Cheol Kang, Koo-Yong Park, and Yong-Sik Cho	731
Study on Storm Surge Prediction Model Considering Typhoon Characteristics for Largest Scale Yeon-joong KIM, Sadakazu ITOH, Yoshiyuki OYA, and Jung-sung YOON	736

Why There Are So Many Drowning Accidents Happened at Dadonghai Beach, Hainan, China: Morphodynamic Analysis Zhiqiang Li and Shibing Zhu	741
Modelling of Storm-induced Seawater Flooding in the Suyeong River Area, South Korea: A Case Study due to the Storm Surge and Waves during Typhoon Sanba Jin-Hee Yuk, Junghyun Park, and Minsu Joh	746
Simulation of Typhoon Chaba over Korean Peninsula using HWRF Modeling System Hojin Kim, Ki-Young Heo, Jae-Il Kwon , and Kwang-Soon Park	751
Effects of Landscape Pattern Change on Non-point Source Pollution in Coastal Zone Yuqi Liu, Xin Zhang, and Qianyu Wu	756
Measurements of Long Waves in Port of Klaipėda, Lithuania Loreta Kelpšaitė-Rimkienė, Tarmo Soomere, Ingrida Bagdanavičiūtė, Laura Nesteckitė Marius Žalys	761
Determining Shoreline Response to Meteo-oceanographic Events Using Remote Sensing and Unmanned Aerial Vehicle (UAV): Case Study in Southern Brazil Miguel da G. Albuquerque, Deivid C. Leal Alves, Jean M. de A. Espinoza, Ulisses R. Oliveira, and Rodrigo S. Simões	766
Error-Estimation Ensemble Method in the Forecasting of Tropical Cyclone Tracks Yi Pan, Yongping Chen, Jieying Yuan†, Ying Liu, and Zhenshan Xu	771
Probabilistic Forecast of Coastal Waves for Flood Warning Applications at Reunion Island (Indian Ocean) Sophie Lecacheux, François Bonnardot, Marie Rousseau, François Paris, Rodrigo Pedreros, Alexandre Nicolae Lerma, Hubert Quetelard, and David Barbary	776
The Study for Storm Surge Prediction Using Generalized Regression Neural Networks Hojin Lee, Sungduk Kim, and Kyewon Jun	781
Numerical Simulations of a Meteotsunami using both Atmospheric and Phase-resolving Wave Models in the Yellow Sea Taemin Ha, Jae-Seon Yoon, and Ki-Young Heo	786
Estimating Fluvial Discharges coincident with 21st Century Coastal Storms Modeled with CoSMoS Li H. Erikson , Andrea C. O'Neill, and Patrick L. Barnard	791
Risk Mapping Assessment by Means of Probabilistic Storm Scenarios in a Partially Engineered Beach: Anglet, France Iñaki de Santiago, Denis Morichon, Florian Arnoux, Matthias Delpey, and Irati Epelde	796
Assessment of Flooding Hazards at An Engineered Beach during Extreme Events: Biarritz, SW France Denis Morichon, Iñaki de Santiago , Matthias Delpey, Tom Somdecoste, Aurélien Callens, Benoit Liquet, Pedro Liria, and Philippe Arnould	801
A Database to Study Storm Impact Statistics along the Basque Coast Florian Arnoux, Stéphane Abadie, Xavier Bertin, and Ivan Kojadinovic	806
The Study of Utilization and Precision Based on the Comparison and Analysis of Drone-Based Coastal Hazard Data and Its Application in the Ocean Environment Kyewon Jun, Byong-Hee Jun , Hojin Lee, Sungduk Kim , and Wonjun Tak	811
Coastal Hazards Caused by Different Extreme Storms in the Bohai Sea, China Chunyan Zhou, Chunyang Xu, Jisheng Zhang, Xiaoying Fu, and Yan Yin	816
Experimental Study on Scouring of Land behind Seawall due to Overflowing Tsunami Shota Okura and Tetsuya Hiraishi	821
Impacts of Storm Wave-induced Coastal Hazards on the Coast of China Zai-Jin You, Zezhou Ji , and Yuchuan Bai	826
Study of High Waves caused by Slanting-fetch Effects along the Coast Jae Hyuk Lee and Tae Rim Kim	831
A Bio-physical Assessment of Harmful Algal Bloom (HAB) Outbreak using Multi-dimensional Array Data during 1998-2017 Jin-Yong Jeong, Yoon Hyang Kang, Kyongseok Park, Jung-Ho Um, and Young Baek Son	836
Multi-proxy Characterization of Hurricanes Rita and Ike Storm Deposits in the Rockefeller Wildlife Refuge, Southwestern Louisiana Qiang Yao, Kam-biu Liu , and Junghyung Ryu	841
The Application of Mathematical Analysis to Examine the Beach Erosion along the Upper Texas Coast Daeok Youn and Young Hyun Park	846
Experimental Study on Floating Debris Generated by Solitary Waves Running up a Composite Beach Yao Yao, Zhenhua Huang, and Edmond Y. M. Lo	851
Distribution Characteristics of the Extreme Storm Tides in the Radial Sand Ridges Area of the South Yellow Sea in China Danghan Xie, Ya Tan, Ao Chu, Tianyi Zhou, and Barend van Maanen	856

Numerical Study of Meteo-tsunami Caused by High Pressure System in Winter Season Hyunsu Kim, Yoo-Keun Kim, Seung-Buhm Woo, and Myung-Seok Kim	861
A Surrogate Modeling for Storm Surge Prediction Using an Artificial Neural Network Seung-Woo Kim, Anzy Lee, and Jongyoon Mun	866
Development of Real-time Forecasting Technology for Coastal Disaster Analysis Dong-Seag Kim, Hwa-Young Lee, Dong-Hwan Kim, Sung-Jin Hong , and Hyoung-Seong Park	871
A Surrogate Model for Wave Prediction Based on an Artificial Neural Network Using High-fidelity Synthetic Hurricane Modelling Jongyoon Mun, Seung-Woo Kim, and Jeffrey A. Melby	876
Automatic Sea Fog Detection and Estimation of Visibility Distance on CCTV Youngjin Choi, Hyeong-Gu Choe, Jae Young Choi, Kyeong Tae Kim, Jong-Beom Kim, and Nam-Il Kim	881
Disaster Vulnerability Assessment in Coastal Areas of Korea Tae Soon Kang , Hyeong Min Oh , Eun Il Lee , and Kwang Young Jeong	886
Spatio-temporal Characteristics of Storm Surge Events in the Korean Peninsula Jae-Il Kwon, Jung-Woon Choi, Jong-Chan Lee, In-Ki Min, and Kwang-Soon Park	891
Stochastic Analysis of Typhoon-Induced Storm Surge in the Coastal Area of the Korean Peninsula: Inference from a Nonstationary, Bayesian, Poisson, Generalized Pareto Distribution Tae-Jeong Kim, Kyu-Nam Hwang, and Hyun-Han Kwon	896
Accuracy Improvement of Particle-tracking Simulation Considering Wind Speed using Various Drift Objects Jung-Woon Choi, Jae-Il Kwon, Ki-Young Heo, Kwang-Soon Park , and Jin-Yong Choi	901
Abnormally High Waves induced by Typhoon Vongfong along the Eastern Coast of the Korean Peninsula Kyeong Ok Kim, Hak Soo Lim, Jin-Yong Choi, and Sun-Sin Kim	906
Development of a Real-time Storm-surge Response System for Decision-making Support on the Korean Coast Hwa-Young Lee, Dong-Seag Kim, Yeong-Han Jeong , and Sung-Jin Hong	911
Fine-resolution Numerical Simulations to Estimate Storm Surge Height and Inundation Vulnerability Considering Future Climate Change Scenario Jong Joo Yoon	916
Numerical Study of Standing Wave-Induced Seabed Residual Response with the Non-homogeneous Soil Property Titi Sui, Chi Zhang, Jinhai Zheng, Yakun Guo, and Mingxiao Xie	921
The Need for Coastal Hazard Prevention and its Valuation Methodologies in Europe Gonzalo Malvárez , Fatima Navas , Dennis J. Parker , and Edmund Penning-Rowsell	926

VOLUME 2

HYDRODYNAMICS

A Modified Method for Assessing Hydrodynamic Loads in the Design of Gravity-Based Structures for Offshore Wind Energy Adrián Escobar, José Santos López-Gutiérrez, María Dolores Esteban, and Vicente Negro	931
Influence of Typhoon Path on Salt Water Intrusion in the Modaomen Waterway, China Mingjie Pan, Jun Kong, Zhaoyang Luo, and Zijun Lv	936
Numerical Simulation of Parabolic Profile of Longshore Currents Hwusub Chun and Kyung-Duck Suh	941
An Improved Contaminant Source Identification Method for Sudden Water Pollution Accident in Coaster Estuaries Li Jing, Jun Kong, Qing Wang, and Yuting Yao	946
Numerical Simulation of Tidal Bores using SPH Method Xingye Ni, Shichang Huang, Weibing Feng, and Wenwei Yao	951
Turbulent Flow Field of Propeller Jet around an Open-Type Quay Maoxing Wei, Yee-Meng Chiew, and Dawei Guan	956
Anthropogenic Influences on the Tidal Prism and Water Exchange in Yueqing Bay, Zhejiang, China Chao Ying, Ruijie Li, Xinwen Li, and Yong Liu	961
Numerical Simulation of Wave Propagation over Structures on a Porous Seabed Eun-Hong Min and Weoncheol Koo	966
Improvement on MPS Method for Simulation of Dynamic Pressure in Dam Break Flows Lizhu Wang, QinJiang, Sihang Nie, Jun Zhang, and Iddy Iddy	971

The Lagrangian Coherent Structure and the Sediment Particle Behavior in the Lock Exchange Stratified Flows Hyeyun Ku and Jin Hwan Hwang	976
An Experimental Study on the Interaction between Oscillatory Flow and Idealized Porous Bed Takaaki Shigematsu, Sota Nakajo, and Yuya Okada	981
Numerical Computation of Rapid Flow over Steep Terrain Using Total Acceleration Method Dong Sop Rhee, Si Wan Lyu, and Chang Geun Song	986
Stormwater Inundation Analysis in Small and Medium Cities for the Climate Change Using EPA-SWMM and HDM-2D Sung Eun Kim, Sangeun Lee, Dongwook Kim, and Chang Geun Song	991
Wave Nonlinearity Correction for Parametric Nearshore Wave Modelling Chi Zhang, Qingyang Zhang, Gang Lei, Feng Cai, Jinhai Zheng, and Kefeng Chen	996
Simulation of Storm-Induced Cross-Shore Sediment Transport at Anmok Beach with Wave-Resolving CST3D-WR Duhoon Park, Hyoseob Kim, Seungho Lee, Jungik Lee, and Jeseon Yoo	1001
Sands Escaping Haeundae Beach Hee Jun Lee, Jong-Dae Do, Sun Sin Kim, and Hak Soo Lim	1006
Three-dimensional Variation of Wave Transmission around the Artificial Reefs: An Experimental Study Sungwon Shin, Ilro Bae, and Jong-In Lee	1011
Simulation of Vertical Water Temperature Structure Variation in the Yellow Sea typhoon MEARI Yeong-Yeon Kwon, Jin-Yong Jeong, Jin-Yong Choi, Jae-Seol Shim, Sang-Kwon Hyun, and Jae-II Kwon	1016
The Investigation of Morphology Change Effects on Runup based on 2D Wave Flume Experiment Zhaoyan Xu, Huajun Li, Bingchen Liang, and Dong Young Lee	1021
Numerical Modelling of a Solitary Wave Propagating over a Submerged Rectangular Breakwater Joongcheol Paik and Jae-Seol Shim	1026
Prediction of Wave Runup on Columns of Two Semi-submersibles Models Deping Cao, Wei Jian, Zhenhua Huang, and Edmond Y.M. Lo	1031
An Assessment of Swash Excursion Predictors using Field Observations Marinella Passarella, Sandro De Muro, Andrea Ruju, and Giovanni Coco	1036
Assimilation of Different SST Datasets to a Coastal Ocean Modeling System in the Yellow and East China Sea Kyungman Kwon, Byoung-Ju Choi, and Sang-Ho Lee	1041
Relative Contribution of Wave Setup to the Storm Surge: Observations and Modeling Based Analysis in Open and Protected Environments (Truc Vert beach and Tubuai island) R. Pedreros, D. Idier, H. Muller, S. Lecacheux, F. Paris, M. Yates-Michelin, F. Dumas, L. Pineau-Guillou, and N. Sénéchal	1046

COASTAL ENGINEERING

Laboratory Experiments on Characteristics of Perforated-type Floating Breakwaters Jae-Seon Yoon, Taemin Ha, and Jaesang Jung	1051
Revisiting Head Loss of the Perforated Wall with Vertical Slits Insik Chun, Hanuel Kang, and Hak Soo Lim	1056
Model Test on Influence of Berth Length on LNG Vessel Mooring under Wave-Current-Wind Loads Huiming Tan, Fumao Chen, and Jia Chen	1061
Parametric Guidelines of Tombolo Formations behind Detached Breakwater Systems in Spanish Mediterranean Coast Isabelo García, Vicente Negro, Jose Santos López, María D. Esteban, and Jose M. Del Campo	1066
Simulation of Normandy Invasion on 6th of June, 1944 John Vassie and Byung Ho Choi	1071
Field Experiment to Check the Performance of New Wave Dissipating Block Yongmin Oh and Sungwon Kim	1076
Wave Transmission Coefficient for Rubble Mound Structures with Superstructures Young-Taek Kim and Jong-In Lee	1081
In-situ Measurements of Wave Impact Pressure on a Composite Breakwater: Preliminary Results B. Larroque, P. Arnould, F. Luthon, P.A. Poncet, A. Rahali, and S. Abadie	1086
Combined Approach of Empirical Mode Decomposition and Artifical Neural Network for Sea-level Record Analysis Sooyoul Kim and Han Soo Lee	1091

Comparison of High Wave Hindcasts during Typhoon Bolaven (1215) using SWAN and WAVEWATCH III Model Tae Rim Kim and Jae Hyuk Lee	1096
Numerical Modeling of Permeable Floating Breakwater under the Action of Waves Yufen Cao, Yang Shi, Yuchuan Bai, Shaowu Li, Hanbao Chen, and Huili Yang	1101
The Influence of Tidal Current on the Orientation of Wharf Axis and the Optimization of Plane Layout Qiu Zhai, Jie Hou, Huakun Wang, and Jiaan Yan	1106
Experimental and Numerical Investigation of Solitary Wave Run-up Reduction Khawar Rehman, Koo-Young Park, and Yong-Sik Cho	1111
Stability on Concrete Armor Unit at Sharply Curved Corner Jong-In Lee and Young-Taek Kim	1116
A Comparison of Numerical Models with Experimental Data for Stem Waves along a Vertical Wall due to Monochromatic Waves Choong Hun Shin, Sung Bum Yoon, and Sae Chan Oh	1121
Wave-Induced Current Analysis Based on Digital Image Correlation Techniques Using UAV Bumshick Shin and Kyu-Han Kim	1126
Nonlinear Transformation of Storm Waves and Impacts on Nearshore Mound in Haeundae Beach, Korea Won Kyung Park, Yong Ho Moon, Sung Yeol Chang, Woen Mu Jeong, Jang Won Chae, Kyong Ho Ryu, Yeon S. Chang, and Jae Youll Jin	1131
Relationship between Wave Height and Sampling Interval: Revisiting Individual Wave Analysis Method Hong-Yeon Cho, Hyuk-Jin Choi, Shin-Taek Jeong, and Dong-Hui Ko	1136
Hydraulic Gradient Reduction Effects on Sand-Water Mixture Flows Caused by Electro-Magnetic Force Generation Gil-Lim Yoon, Hong-Yeon Cho, Yoo-Seung Kim, and Seung-Hee Kwon	1141
Nonlinear Interaction of Unidirectional Random Waves along a Vertical Wall Kyong Ho Ryu, Choong Hun Shin, Jong-In Lee, and Sung Bum Yoon	1146
Eight-Phase Integration of Powers of Bed Shear Velocity for Entrainment and Bed Load Vector Hyoseob Kim, Byoungwook Min, Seungho Lee, Duhoon Park, and Jeseon Yoo	1151
Joint Impact of Currents and Winds on the Patch Formation Near the Coasts of the Gulf of Finland Andrea Giudici, Jaan Kalda, and Tarmo Soomere	1156
Operational Wave Forecast in the German Bight as part of a Sensor- and Risk based Early Warning System Norman Dreier and Peter Fröhle	1161
Failure Mechanism of Armor Blocks of Submerged Breakwater Yong Hwan Cho, Chu Zhang, Tomoaki Nakamura, and Norimi Mizutani	1166
Erosion Behavior of Sand-silt Mixtures: the Role of Silt Content Peng Yao, Zhan Hu, Min Su, Yongping Chen, and Suying Ou	1171
GPU-Accelerated Boussinesq Model Using Compute Unified Device Architecture FORTRAN Boram Kim, Chanyoung Oh, Youngmin Yi, and Dae-Hong Kim	1176
Estimation of Dynamical Forces on Turbidity Curtain in Combined Wave-Current Flow Shaowu Li, Zezhou Ji, Qingwei Wu, and Yang Shi	1181
Examining the Effect of Time Lags of Meteorological Variables on a Wave Forecasting Model Jihee Oh and Kyung-Duck Suh	1186
Monitoring of Structural Dynamic Characteristics of Socheongcho Ocean Research Station Wonsul Kim, Jin-Hak Yi, In Ki Min, and Jae Seol Shim	1191
Imaging the Completely Buried Anomaly using a Small-ship Three-dimensional Seismic Survey System Wonsik Kim, Jungkyun Shin, Hyundo Kim, Bo-Yeon Yi, Chanhoo Park, Chansu Kim, Gabseok Seo, Dongwoo Cho, Yonghwa Jung, Ho-Young Lee, and Dong-Hyo Kang	1196
Numerical Studying on The Sedimentary Processes at A Mudflat Near Yangtze River Chunyang Xu, Yongping Chen, and Lili Yu	1201
A Cost-Effective Ship Safety Data Transfer in Coastal Areas Hyun Yang	1206
Observation of Surface Water Temperature and Wave Height along the Coast of Pohang using Wave Gliders Sung-Hyub Ko, Jong-Wu Hyeon, Shinje Lee, and Jung-Han Le	1211
Iranian Seas Waters Forecast - Part I: An Improved Model for The Persian Gulf S. Abbas Haghsheenas, Sarmad Ghader, Daniel Yazgi, Edris Delkhosh, Nabiallah Rashedi Birgani, Azadeh Razavi Arab, Zohreh Hajisalami, Mohammad Hossein Nemati, Mohsen Soltanpour, and Morteza Jedari Attari	1216

Development of Generalized Model for Estimation of Sediment Siltation in Coastal Waterways of China Zezhou Ji, Zai-Jin You, Zhiqiang Hou, and Yun Wei	1221
A Laboratory Study of Rheological Properties of Soft Mud Using a Dynamic Shear-controlled Oscillatory Viscometer Sihang Nie, Qin Jiang, Lizhu Wang, Jun Zhang, and Peng Liu	1226
Measurement of Sediment Concentration of the Oscillatory Flow in the Surf- and Swash-zone J. Wang, Z. Qu, Z. Xu, J.S. Shim, B. Liang and D.Y. Lee	1231
Stability Assessment Formulas for an Interlocking Caisson Breakwater under Oblique Wave Conditions Woo-Sun Park, Deokhee Won, Jihye Seo, and Byeong Wook Lee	1236
Modelling Shoreline Evolution at Anmok Beach by Using CST3D-WA Seungho Lee, Hyoseob Kim, Duhoon Park, and Hak Soo Lim	1241
Reliability Analysis of the Long Caisson Breakwater considering to the Wave Force Reduction Parameter Gee Nam Lee, Il Keun Lee, and Dong Hyawn Kim	1246
3D Experimental Analysis of Turbulence Induced Scour in Front of the Ruble Mound Breakwater Sevket Cokgor and Ozgur Durmus	1251
Wave Climate Definition on Modeling Morphological Changes in Figueira da Foz Coastal System (W Portugal) Caroline Ferreira, Paulo A. Silva, Sandra Fernández-Fernández, Paulo Baptista, Tiago Abreu, Soraia Romão, Ângela Fontán-Bouzas, Xavier Bertin, and Carla Garrido	1256
An Engineering Method For The Preliminary Functional Design Of Perched Beaches. Theoretical Approach Luis Moreno, Vicente Negro, Luis Garrote, Juan José Muñoz-Pérez, José Santos López, and María Dolores Esteban	1261
Assessment of Dredging/Dumping Scenarios for Figueira da Foz Coastal Region (W Portugal) Sandra Fernández-Fernández, Paulo A. Silva, Caroline Ferreira, Américo S. Ribeiro, Tiago Abreu, Soraia Romão, Paulo Baptista, Ângela Fontán-Bouzas, João M. Dias, Carlos Coelho, and Cristina Bernardes	1266
Use of Optical Video Imagery to Improve Wave run-up Prediction Accuracy Su-Chan Lee, Jin-Yong Choi, Kwang-Soon Park, Sun-Sin Kim, Seon-Jeong Kim, and Ki-Cheon Jun	1271
Analysis of Positioning Accuracy of PPP, VRS, DGPS in Coast and Inland Water Area of South Korea Wonseok Jang, Hansan Park, and Sulgee Park	1276
Nonlinear Interaction Among Wave, Current and Submerged Breakwater Koo-Yong Park	1281

MARINE RENEWABLE ENERGY

A New Classification of Wave Energy Converters Used for Selection of Devices M. Dolores Esteban, José-Santos López-Gutiérrez, Vicente Negro, Marcelo Laviña, and Pedro Muñoz-Sánchez	1286
Wave Energy Potential Assessment and Feasibility Analysis of Wave Energy Converters. Case Study: Spanish Coast José-Santos López-Gutiérrez, M. Dolores Esteban, and Vicente Negro	1291
Numerical Study on Optimization of the Float in a Shoreline Wave Energy Converter Wei Peng, Yaning Fan, and Jisheng Zhang	1296
Assessment of Tidal Current Energy Potential at Uldolmok in the Southwestern Coast of Korea Dong Hui Ko, Jin-Soon Park, and Kwang-Soo Lee	1301
The Application of Dynamic Tidal Power in Korea Young Hyun Park	1306
Experimental Test of 3kW Cylindrical Wave Energy System with Horizontal Rotation Min-Su Park, Youn-Ju Jeong, and Jeongsoo Kim	1311
Integration Analysis and Evaluation of New Hybrid 3kW Ocean Wave Energy Extraction System Jeongsoo Kim, Min Su Park, and Youn Ju Jeong	1316
Development of a Desalination System Driven by Low Energy Ocean Surface Waves Manuel Gerardo Verduzco-Zapata, Aramis Olivos-Ortiz, Marco Liñán-Cabello, Christian Ortega-Ortiz, Marco Galicia-Pérez, Chris Matthews, and Omar Cervantes-Rosas	1321
Numerical Investigation on the Vortex-Induced Vibration of a Flexible Plate behind a Circular Cylinder Huakun Wang, Qiu Zhai, Jie Hou, and Limin Xia	1326

Experimental Studies on Performances of Capsule Type Wave Energy Generation System under Action of Waves Haitao Yu, Zhigang Bai, Chongjiu Zhao, Weiling Wang, Xuan Ma, and Wu Yang	1331
Wave and Wind Energy Potential including Extreme Events: A case Study of Mexico Angélica Felix, Edgar Mendoza, Valeria Chávez, Rodolfo Silva, and Germán Rivillas-Ospina	1336
Energy Generation Efficiency due to Wave Overtopping on Floating-Overflow-Type Wave Energy Converter Dong Soo Hur, Yeon Myeong Jeong, Jung Lyul Lee, In Ho Kim, and Woo Dong Lee	1341
Three-dimensional Numerical Simulation of Airflow in Oscillating Water Column Device Kwang Ho Lee and Tag Gyeom Kim	1346
Design of the Mooring System for a Floating Wave Energy Converter Xin He, Yougang Tang, Liqin Liu, and Ruoyu Zhang	1351

COASTAL MANAGEMENT

Development of a Novel Tool for the Monitoring of Shipping Traffic Within the Strait of Sicily (Central Mediterranean): the BIODIVAlUE AIS Vessel Tracker Alan Deidun, Adam Gauci, Joel Azzopardi Cedric Camilleri Denis Cutajar Marie Chalabreysse, and Florian Trinquard	1356
Estimation of Depth of Closure Near Gangneung Port in Korea Haneul Kang, Insik Chun, and Byungcheol Oh	1361
Optimizing the Number of Anchorages Based on Simulation Model of Port-channel-anchorage Composite System Wei Wang, Li Huang, Ji Ma, Qu Wei, and Zhaoxia Guo	1366
Preliminary Study for Detecting of Ocean Wave Parameters using CCD Images Jongchul Yoon and Dongseob Song	1371
Perspectives of Government Officials and Professional Experts on the Hydrographic Surveying of Bathing Beaches in the Republic of Korea In Joo Yoon	1376
Monitoring Applications for Multifunctional Unmanned Surface Vehicles in Marine Coastal Environments Byung-Cheol Kum , Dong-Hyeok Shin , Jung Han Lee, TaeJun Moh, Seok Jang, Seung Yong Lee, and Jin Hyung Cho	1381
Evaluation of Cadastral Discrepancy and Continuous Cadastral Mapping in Coastal Zone using Unmanned Aerial Vehicle Seunghye Sim and Dongseob Song	1386
Lessons Learned from Record-High Storm Surges and Associated Inundations in Pärnu, SW Estonia Valdeko Palginõmm, Kaarel Orviku, Ülo Suursaar&, Are Kont, Hannes Tõnisson, and Reimo Ravis	1391
Simplified Methodology for Urban Flood Damage Assessment at Building Scale using Open Data Seung-hyun Eem, Beom-joo Yang, and Haemin Jeon	1396
Extending Resilience Assessment to Dynamic System Modeling: Perspectives on Human Dynamics and Climate Change Research Nina S.-N. Lam, Yi Qiang, Kenan Li, Heng Cai, Lei Zo, and Volodymyr Mihunov	1401
Applying a Coastal Vulnerability Index to San Mateo County: Implications for Shoreline Management Brian Gerrity, Michael Robert Phillips, and Catherine Chambers	1406
Climate Change, Coastal Management and Acceptable Risk: Consequences for Tourism Michael Robert Phillips , Andrew Lawson Jones, and Tony Thomas	1411
Current Status and Decadal Growth Analysis of Krishna - Godavari Delta Regions using Remote Sensing K N Reshma and R Mani Murali	1416
Management Priorities in San Andres Island Beaches, Colombia: Associated Risks Luana Portz, Rogério Portantiolo Manzolli, and Nubia Garzon	1421
A Study of the Contaminated Sediment Management System in Korea, with Suggestions for Improvement Jin Young Choi, Suk Hyun Kim, Eun-Ji Won, Dong-Beom Yang, Chang Soo Chung, Kyoungrean Kim, Ki Young Choi, Kongtae Ra, Kyung-Tae Kim, Jee Young Yim, Chae Woon Lim and Gi Hoon Hong	1426
Biological Impact Assessment of Sediments:A Preliminary Study for Using Pore Water and Elutriate as Exposure Media Yehui Gang, Jin Young Choi, Kongtae Ra, Kyun-Woo Lee, Chang-Soo Chung, Kyoungrean Kim, and Eun-Ji Won	1431
Multiple Satellite Image Data Coordinative Computation Technology and Application in Coast Region Xin Zhang, Qianyu Wu, and Yongxin Chen	1436
Surveys Applied to the Improvements of Beaches. Case Studies: Las Canteras, Hoya Pozuelo and Salinetas (Gran Canaria Island, Spain) Emilio Vizcaino, M. Dolores Esteban, José-Santos López-Gutiérrez, and Vicente Negro	1441

When Socio-Economic Plans Exacerbate Vulnerability to Physical Coastal Processes on the South East Coast of India G. Muthusankar, C. Proisy, D. Balasubramanian, N. Bautès, R. S. Bhalla, R. Mathevet, A. Ricout, D. Senthil Babu, and S. Vasudevan	1446
Thermal Stratification Modeling in the Inner Coastal Bays Gi Seop Lee, Hong Yeon Cho, and Soon Mo An	1451
Tracing the Pollution Source Using Pb Isotopes in Sediments of the Coastal Region Surrounding the National Industrial Complex, Korea Hyeryeong Jeong, Kongtae Ra, Kyung-Tae Kim, Eun-Soo Kim, Seung-Yong Lee, and Min-Seok Choi	1456
Systematic Coastal Field Survey Method and Coastal Structures Management Status in the Korean Coast Hyeong Min Oh, Soon Mi Hwang, Soo Min Kim, Tae Soon Kang, and Kwang Young Jeong	1461
Role of Official Development Assistance in Enhancing Resilient Coastal Community in Small Island Developing States Yun Eui Choi, Jae-Youll Jin, Yeon Sihk Chang, Bonghee Jang, and Jinhung Chon	1466
Correlation Between SST and CDOM During Summer Coastal Upwelling Along the Southeast Coast of Korea Seung-Hwan Min, Mi-Ok Park, Sang-Woo Kim, In-Seong Han, Wonkook Kim and Young-Je Park	1471
Coastal Flood Disaster in Sri Lanka-May 2017: Exploring Distributional Changes in Rainfall and Their Impacts on Flood Risk Chandrasekara, S.S.K. , Sumiya Uranchimeg , Hyun-Han Kwon, and Seung Oh Lee	1476
Coastal Hypoxia in the Jinhae Bay, South Korea: Mechanism, Spatiotemporal Variation, and Implications (based on 2011 survey) Jae-Hyun Lim, Sang Heon Lee, Junhyung Park, Jiyoung Lee, Joo-Eun Yoon, and Il-Nam Kim	1481
Assessing Impacts of Large-scale Coastal Land Reclamation on Marine Environment on the Coast of China Cong Hu, Zai-Jin You, Hai-ying Mao, and Xiao-ming Hu	1486
Web-based Geovisualization System of Oceanographic Information using Dynamic particles and HTML5 Jinah Kim	1491
Co-creating Resilience Solutions to Coastal Hazards Through an Interdisciplinary Research Project in New Zealand Paul S. Kench, Emma J. Ryan, Susan Owen, Robert Bell, Judy Lawrence, Bruce Glavovic, Paula Blackett, Julia Becker, Paul Schneider, Michael Allis, Mark Dickson, and Hamish G. Rennie	1496
The Necessity of Coastal Management in Busan Considering Human and Natural Conditions: The Case of the Barrier Islands in the Nakdong River Estuary Woo Jin Shim and Chan Woong Kim	1501
Implementation of a Numerical Model of Metals for Total Maximum Daily Loads (TMDLs) in Onsan Harbor, Korea Yong Hoon Kim, Darian E. Sugarman, Hae-Cheol Kim, Seunghyun Son, Ho Kyung Ha, Won Keun Chang, Ki Won Han, and Jongseong Ryu	1506
Challenges of the Coastal Use Fee and Levy System in Korea Jeong-In Chang , Hee-Jung Choi, and Seokmun Choi	1511
Development of New Coastal Erosion Countermeasure Using Wave Energy Control Method Yoonkoo Kang and Seunghyun An	1516
Rethinking Coastal Community Approaches to Climate Change Impacts and Adaptation Carlo Sorensen, Per Knudsen, Per Sorensen, Thomas Damgaard, Mads R. Molgaard, and Jürgen Jensen	1521
Geomorphology, Sedimentology, Benthic Habitat as Tools For Supporting Coastal Management: Comparison Between Australian And Mediterranean Beach Systems Sandro De Muro, Sira Tecchiato, Carla Buosi, Marco Porta, Marco Bachis, and Angelo Ibba	1526
Preparing Waterfront Brownfields Redevelopment for Climate Change: the Water City Project, Almada (Portugal) André Fernandes, João Figueira de Sousa, Susana S. Brito, Bruno Neves, and Tânia Vicente	1531
Analysis of Coastal Vulnerability Along the Uruguayan Coasts Sebastián Solari, Rodrigo Alonso, and Luis Teixeira	1536
Exploring the Spatial Pattern of Environmental Change Efficiency of Coastal Shrinking Cities in Taiwan Hsing-Fu Kuo and Yueh-E Lu	1541
Flood Hazard Prevention Appraisal in Europe: Training Key Stakeholders on the Benefits and Costs of Efficient Protection and Response Fatima Navas, Gonzalo Malvárez, Edmund Penning-Rowsell, and Dennis J. Parker	1546
 MANAGING THE COASTS OF BUSAN	
Variations of Nearshore Currents induced by Seasonal Waves in Haeundae Mujong Kim, Hak Soo Lim, Jong-Dae Do, Sun-Sin Kim, Hee Jun Lee, and Jae-Seol Shim	1551

Improving the Performance of Rip Current Forecasting Index with a Focus on Haeundae Beach, Korea

Jooyong Lee, Inchul Kim, and Jung Lyul Lee

1556

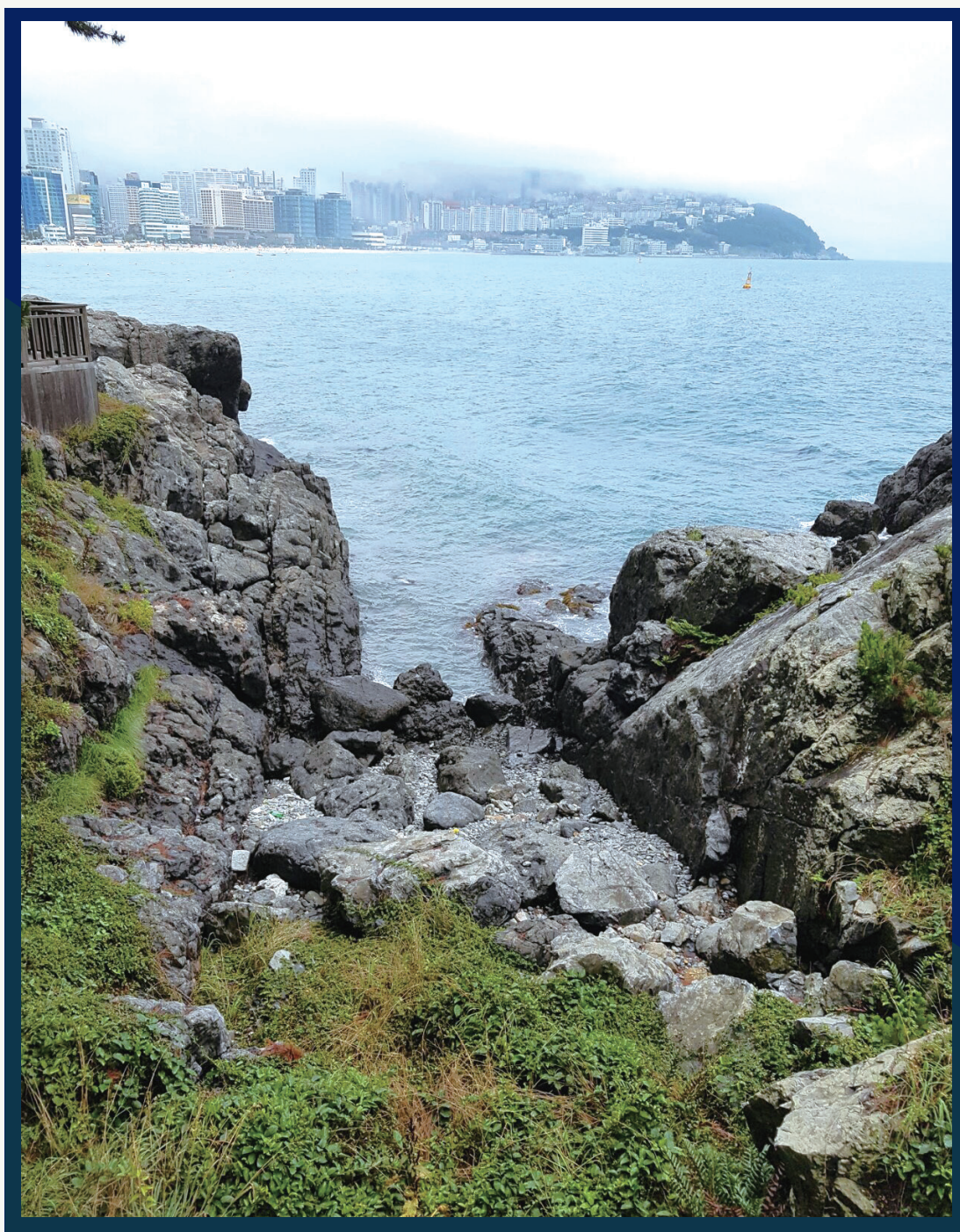
Flood Damage Assessment in Building Scale Caused by the Coastal Inundation Height at Haeundae Beach, Busan

Haemin Jeon, Seung-hyun Eem, and Junghyun Park

1561

Proceedings of the 15th International Coastal Symposium

JOURNAL OF COASTAL RESEARCH



HAEUNDAE BEACH LOCATED ON THE SOUTHEASTERN COAST
OF THE KOREAN PENINSULA

KOREA INSTITUTE OF OCEAN SCIENCE & TECHNOLOGY

www.kiost.ac.kr