The Thirty-first (2021) International
Ocean and Polar
Engineering Conference
(International Offshore and Polar Engineering Conference)
Including additional ISOPE symposia:

Hydrodynamics & CFD
Comparative Study, CCP, MMS, SPH
Coastal Engineering & CFD
Offshore Mechanics, Ocean Technology
Clean Energy Tech: Ocean, Wind
4th Advanced Ship Technology
6th Underwater Technology
10th Tsunami & Safety
12th Arctic Science & Technology
12th Renewable Energy & Environment
13th Sloshing Dynamics & Design
16th Deep Ocean Mining & Gas Hydrates

Updated Technical Program
(zoom time to be updated)

Refereed papers from 40+ countries in 123 technical sessions
1 Plenary and 2 Keynote and multiple Focus sessions
Full Program with General Information, Advance Registration and Venue Hotel. Paper List, Reservations, and Updates at
http://www.isope.org/conferences-symposia-and-workshops/
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ISOPE-2021 Conference Co-chairs

Jin S Chung (USA); Ronald Knapp (USA); Demos Angelides (Greece); Sa Young Hong (Korea); Hiroyasu Kawai (Japan); Hua Liu & Decheng Wan (China)

ISOPE-2021 Rhodes:
Hybrid (Live / Online Video)
The 31st Annual ISOPE-2021 Conference,
Rhodes, June 20-25, 2021

Expanded Session List and Full Program (digital)
with Paper List: Download from www.isope.org or
http://www.isope.org/conferences-symposia-and-workshops/

Full Program (Session and Paper List) and Update:
http://www.isope.org/conferences-symposia-and-workshops/
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Back to In-person Conference: ISOPE-2022
The 32nd Annual International Ocean and Polar (Arctic)
Engineering Conference, Shanghai, June 6-10, 2022
Welcome to the ISOPE-2021 Rhodes Conference

We greatly appreciate the excellent response and help, despite the Covid-19 pandemic in 2020, we have received from colleagues around the world in the successful organization of the Hybrid 31st International Ocean and Polar (Arctic) Engineering Conference (ISOPE-2021) Rhodes, Greece, June 20-25, 2021. The Conference features 123 sessions of peer-reviewed papers and 3 plenary and keynote presentations from more than 40 countries, including the ISOPE specialty symposia as a part of the ISOPE-2021 Conference.

The conference program is in Live as well as video presentations and discussions.

The purposes of the ISOPE conference are to:
* Promote technological progress and activities, international technological transfer and cooperation, and opportunities for engineers to maintain and improve technical competence; and
* Provide a timely international forum for technical activities, cooperation, opportunity and fellowship among researchers and engineers by developing focused session topics with high-quality papers (in both originality and significance) accepted through rigorous review, establishing high international standards for publication and worldwide distribution, and promoting interdisciplinary interaction between academia and industry.

Since 1990, the International Society of Ocean and Polar Engineers (ISOPE) has held 64 successful international meetings with all peer-reviewed papers:
- Annual ISOPE conferences, starting in Edinburgh, 1991, have been held around the world in San Francisco, Singapore, Osaka, The Hague, Los Angeles, Honolulu, Montréal, Brest, Seattle, Stavanger, Kitakyushu, Honolulu, Toulon, Seoul, Lisbon, Vancouver, Beijing, Maui (Hawaii), Rhodes, Anchorage, Busan, Kona (Hawaii), Sapporo, and Shanghai (hybrid).
- Since 1992, the annual ISOPE conference program has been the world's largest of its kind with peer-reviewed papers.
- Pacific/Asia Offshore Mechanics Symposium (PACOMS), beginning with the 1st PACOMS-90 Seoul in 1990, also in Beijing, Busan, Daejeon, Vladivostok, Dalian, Bangkok, Shanghai, Gold Coast, Jeju Island, and Dalian, 2020.
- European Offshore Mechanics Symposium (EUROMS), starting with the 1st EUROMS-90 Trondheim in 1990; also EUROMS-99 Moscow, EUROMS-2012 Istanbul.
- ISOPE HPM (High-Performance Materials) Symposium: Started in Honolulu, 2003 and expanded every year with emerging topics.
- A series of ISOPE specialty symposia: ANGT; SBD; Nanotechnology NANOS; Frontier Energy; Sloshing & Dynamics; Renewable Energy/Environment; Tsunami; Arctic Sci & Tech; Arctic Materials; Asset Integrity; High-Mn/Cryogenic Materials; Materials Reliability, EAC.

On behalf of the Technical Program Committee, it is our pleasure to welcome participants from all over the world to the ISOPE-2021 (hybrid) Conference in Rhodes, Greece.

ISOPE-2022 Shanghai is back to “In-person.”

Jin S Chung
USA
Sa Y Hong
Korea

Ronald H Knapp
USA
H Kawai
Japan

Demos Angelides
Greece
H Liu & DC Wan
China

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PRESENTATION LIST BY TOPICS

**Plenary:** 2011 Tsunami in Japan

*Ten-year-long Progress from the 2011 Great East Japan Earthquake in Tsunami Monitoring and Coastal Defense in Japan*
Hiroyasu Kawai, Port and Airport Research Institute, Japan

**Keynote 1:** Pacific Ferromanganese Crusts: ROV Exploration

*Geological Parameters Controlling the Variability in Grade and Abundance of the Ferromanganese Crusts in the NW Pacific Seamounts: A Review of ROV Exploration and Geochemical Characterization*
Akira Usui, Anna Nagaokaka, Kochi University; Katuzhiko Suzuki, JAMSTEC, Japan

**Keynote 2:** Pacific Ferromanganese Nodules: Mining Vehicle Control

*Deep-Ocean Manganese Nodule Miners and Collectors on 18,000-ft Seafloor: Full-scale Miner Touchdown and Automatic Track-keeping Control*
Jin S Chung, ISOPE and formerly Lockheed Missiles & Space Co. – Ocean Mining Program, USA

ZOOM PRESENTATIONS

**OPENING SESSION, SUNDAY June 20**
(to be updated on www.isope.org)

Conference Opening

Welcome to Rhodes Virtual, 2021

President’s Message

Invitation to ISOPE-2022 (In-person) Conference, Shanghai

Virtual Coffee Break in preparation

Monday **CCP-WSI (on Zoom)** Presentations to be updated

**CCP-WSI Showcase 1 (on Zoom): Monday (Volume III)**
Start Time: 19:00PM (Beijing), 12:00PM (UK, BST), 4:00AM (California)
Chair: Ling Qian, Manchester Metropolitan University, UK
Co-Chair: Edward Ransley, University of Plymouth, UK

**CCP-WSI Showcase 2 (on Zoom): Monday (Volume III)**
Start Time: 21:00PM (Beijing), 2:00PM (UK, BST), 6:00AM (California)
Tuesday MMS (on Zoom) Presentations to be updated

Multi-Scale Hybrid Modelling 1 (on Zoom)

Start Time: 19:00 PM (Beijing), 12:00 PM (UK, BST), 4:00 AM (California)

Chair: Zhihua Xie, University of Cardiff, UK
Co-Chair: Shiqiang Yan, City University, London, UK

Multi-Scale Hybrid Modelling 2 (on Zoom)

Chair: Qingwei Ma, City University, London, UK
Co-Chair: V. Sriram, IIT Madras, India

Panel Discussion (30 min on Zoom)

Wednesday PARTICLE METHODS (on Zoom) Presentations

Tentative time: 8:00 – 10:05 GMT (To be updated)

Chair: Abbas Khayyer, Kyoto University, Japan
Co-Chair: Shiqiang Yan, City University, London, UK

PANEL DISCUSSION
State-of-the-art of SPH for Ocean/Coastal Engineering

16th OCEAN MINING AND GAS HYDRATES SYMPOSIUM

OMGH I: Gas Hydrates 1

OMGH II: Gas Hydrates 2

DEEP OCEAN MINERALS:
Exploration and Mining Technology

Keynote 1

Geological Parameters Controlling the Variability in Grade and Abundance of the Ferromanganese Crusts in the NW Pacific Seamounts: A Review of ROV Exploration and Geochemical Characterization

Akira Usui, Anna Nagaokaka, Kochi University; Katuzhiko Suzuki, JAMSTEC, Japan
OMGH III: Deepsea Exploration

Keynote 2

Deep-Ocean Manganese Nodule Miners and Collectors on 18,000-ft Seafloor: Full-scale Miner Touchdown and Automatic Track-keeping Control
Jin S Chung, ISOPE, Formerly Lockheed Missiles & Space Co. – Ocean Mining Program, Mountain View, California, USA

OMGH IV: Manganese Nodules & Crusts Miner Collector

OMGH V: Deepsea Drilling

OMGH VI: Panel Discussion

RENEWABLE ENERGY: OFFSHORE WIND AND OCEAN

Wind Turbine I

Wind Turbine II: Aero-Hydrodynamics

Wind Turbine III

Wind Turbine IV

Wind Turbine V: Wind Farm

Wind Turbine VI:

Wind Turbine VII: Floating 1

Wind Turbine VIII: Floating 2

Wind Turbine IX: Floating 3

Wave Energy

Ocean & Wave Energy

Tidal Energy

Ocean, OTEC & Solar Technology

OCEAN & WIND Energy: Panel

OCEAN TECHNOLOGY

OCEAN TECHNOLOGY I: Floating Tunnel, Bridge
OCEAN TECHNOLOGY II: Floating System - Floatover

OCEAN TECHNOLOGY III: TLP

FLOATING SYSTEM

Floating System 1
Floating System 2
Floating System 3

ENVIRONMENT AND ECOLOGY

Environment and Ecology 1
Environment and Ecology 2

GEOTECHNOLOGY

GEOTECH I: Soil Properties
GEOTECH II: Piles and Anchors 1
GEOTECH III: Piles and Anchors 2
GEOTECH IV: Foundation, Stability
GEOTECH V: Spudcan

SUBSEA, PIPELINES, RISERS AND UMBILICALS

SUBSEA: South China Sea
PIPELINES & RISERS I: Flow Assurance 1
PIPELINES & RISERS II: Flow Assurance 2
PIPELINES & RISERS III: Pipeline I
PIPELINES & RISERS IV: Pipeline 2
PIPELINES & RISERS V: Pipeline 3
PIPELINES & RISERS VI: Riser
PIPELINES & RISERS VII: Flexible and Umbilical
PIPELINES & RISERS VIII: Installation
PIPELINES & RISERS IX: Transportation
PIPELINES & RISERS X: Panel

UNDERWATER TECHNOLOGY
UNDERWATER TECH I: Sensing, Communication
UNDERWATER TECH II: Navigation, Path Planning
UNDERWATER TECH III: Control
UNDERWATER TECH IV: Operation
UNDERWATER TECH V: Design, Application
UNDERWATER TECH VI: Hydraulics, CFD
UNDERWATER TECH VII: Panel

ARCTIC SCIENCE & TECHNOLOGY
ARCTIC & POLAR I: Ice Loads on Structures
ARCTIC & POLAR II: Ships in Ice and Vessel Design 1
ARCTIC & POLAR III: Ships in Ice and Vessel Design 2
ARCTIC & POLAR IV: Ice Ridges and Ice Properties
ARCTIC & POLAR V: Arctic Regions
ARCTIC & POLAR VI: Iceberg Towing
ARCTIC & POLAR VII: Numerical Simulations
ARCTIC & POLAR VIII: Ships Maneuvering and Icebreaking
ARCTIC IX: Panel

HYDRODYNAMICS
HYDRODYNAMICS I: Sea State
HYDRODYNAMICS II: Wave Loads 1
HYDRODYNAMICS III: Wave Loads 2
HYDRODYNAMICS IV: Wave Characteristics 1
HYDRODYNAMICS V: Wave Characteristics 2
HYDRODYNAMICS VI: Ship Motion 1
HYDRODYNAMICS VII: Ship Motion 2
HYDRODYNAMICS VIII: Wave Impact, Slamming 1
HYDRODYNAMICS IX: Wave Impact, Slamming 2
HYDRODYNAMICS X: Ship Waves
HYDRODYNAMICS XI: Resistance and Bubble Drag 1
HYDRODYNAMICS XII: Resistance and Bubble Drag 2

TSUNAMI
PLENARY ON TSUNAMI
Ten-year-long Progress from the 2011 Great East Japan Earthquake in Tsunami Monitoring and Coastal Defense in Japan
Hiroyasu Kawai, Port and Airport Research Institute, Japan

TSUNAMI AND SAFETY I: Generation
TSUNAMI AND SAFETY II: Disaster and Mitigation
TSUNAMI AND SAFETY III:

SLOSHING DYNAMICS
SLOSHING I: Rocket, SPH
SLOSHING II: Impact
SLOSHING III: Baffles

VORTEX SHEDDING & VIV
Vortex Shedding & VIV 1
Vortex Shedding & VIV 2
Vortex Shedding & VIV 3

COASTAL HYDRODYNAMICS
COASTAL HYDRODYNAMICS I: Wave Mechanics 1
COASTAL HYDRODYNAMICS II: Wave Mechanics 2
COASTAL HYDRODYNAMICS III: Wave Mechanics 3
COASTAL HYDRODYNAMICS IV: Storm Surge
COASTAL HYDRODYNAMICS V: Sediment Transport & Nature-based Solutions 1
COASTAL HYDRODYNAMICS VI: Sediment Transport & Nature-based Solutions 2
COASTAL HYDRODYNAMICS VII: Coastal Structures 1
COASTAL HYDRODYNAMICS VIII: Coastal Structures 2
COASTAL HYDRODYNAMICS IX: Ships & Ports
COASTAL HYDRODYNAMICS X: Panel

HIGH PERFORMANCE MATERIALS
HPM I: Damage Mechanism Affecting HPM
HPM II: Advances in Welding Techniques
HPM III: Failure Analysis of HPM
HPM IV: Advances in HPM
HPM V: Panel

MECHANICS, RISK AND ANALYSIS
Mechanics and Analysis 1
Mechanics and Analysis 2
Mechanics and Analysis 3

ADVANCED SHIP TECHNOLOGY
ADVANCED SHIP I: Bow Wave & Resistance
ADVANCED SHIP II: Cavitation
ADVANCED SHIP III: CFD
ADVANCED SHIP IV: Design
ADVANCED SHIP V: Energy Saving Device
ADVANCED SHIP VI: High Speed Vehicles
ADVANCED SHIP VII: Maneuvering
ADVANCED SHIP VIII: Motion
ADVANCED SHIP IX: Optimization & Stability
ADVANCED SHIP X: Performance in Waves
ADVANCED SHIP XI: Power & Propeller
ADVANCED SHIP XII: Ship Design
ADVANCED SHIP XIII: Strength
ADVANCED SHIP XIV: Waterjet & Pumpjet
ADVANCED SHIP TECH XV: Panel
TECHNICAL PROGRAM

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Hybrid (Live and Virtual)

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Questions to meetings@isope.org

ISOPE Journals and Conference Proceedings:
http://www.isope.org/publications/

Full Program (digital) and Updates include:
2021 Technical Program Committee (TPC) List Proceedings USB and online

General Information
Information on Entry Visa (NA for 2021): See General Information

Hotel reservation (NA for 2021) : Online reservation only from February to secure a room at ISOPE rates.


Advance Registration and Hotels: Also inside this program:
http://www.isope.org/conferences-symposia-and-workshops/

See General Information for tours.

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http://www.isope.org/ > Publications > Orders

Author Index and Subject Index in Proceedings: Use “Search” from the PDF file of the Conference program and of the Conference proceedings on http://www.isope.org/proceedings/ [To be posted by early June.]
Those who registered receive the entire proceedings with peer-reviewed papers in early June]

Photos: The 30th Annual ISOPE Conference (virtual)

Forthcoming ISOPE In-Person Meetings

15th ISOPE PACOMS-2022 (Pacific Asia Offshore Mechanics Symposium), TBA, September 2022

32nd Annual ISOPE-2022 Conference, Shanghai, China, June 6-10, 2022

Delayed celebration of the 30th ISOPE Anniversary at ISOPE-2022 Shanghai