The Thirty-third (2023) International
Ocean and Polar
Engineering Conference
(Offshore and Polar Engineering Conference)

Including additional ISOPE symposia:

1st Marine Transportation of H2 & CO2 Energy Carriers
   LNG, LH2, LCO2
2nd Intelligent (AI, ML, NN) Hydrodynamics
   2nd Smart Ship Technology
6th Environment Assisted Cracking
   8th Underwater Technology
12th Tsunami & Safety
9th Asset Integrity
14th Arctic Sciences & Technology
10th Cryogenic/Arctic Materials
14th Renewable Energy & Environment
15th Sloshing Dynamics & Design
18th Deep Ocean Mining & Gas Hydrates
21st High Performance Materials Symposium

Technical Program

Refereed papers from 40+ countries in 137 technical general
1 Plenary and 3 Keynotes and multiple Focus sessions
Full Program with General Information, Advance Registration and Venue
Hotel, Paper List, Reservations, and Updates on
https://www.isope.org/conferences-symposia-and-workshops/
ISOPE-2023 Conference proceedings
ISBN 978-1-880653-887; ISSN 1098-6189
All ISOPE Publications: https://www.isope.org/proceedings/
Individual papers are available from www.onepetro.org/isope
Organized and Sponsored by: Technical Program Committee,
   International Society of Offshore and Polar Engineers (ISOPE)
   With cooperating organizations (listed inside)

Co-host: Canadian Association of Petroleum Producers (CAPP)

ISOPE, P.O. Box 189
Cupertino, CA 95015-0189, USA
Fax: +1-650-254-2038
meetings@isope.org; www.isope.org
The 33rd Annual ISOPE-2023 Conference, Ottawa, Canada

ISOPE-2023 Corporate Members and Sponsors. Additional sponsors/supporters on the updated program and online.

ISOPE-2023 Conference Co-chairs
Jin S Chung (USA); Eva Loukogeorgaki (Greece); Sa Young Hong (Korea), Hiroyasu Kawai (Japan); Hua Liu (China), De Cheng Wan (China); Ivana Kubat (Canada), RH Knapp (USA)

ISOPE-2019 Honolulu Conference Secretariat: ISOPE, USA

Presentations at ISOPE-2019 Honolulu In-person Banquet
Awards: Scholarships, Best Organizer, Jin S Chung Award, C H Kim Award, 2019 Best Student Paper
Welcome to the ISOPE-2023 Conference

We greatly appreciate the excellent response, with 1000+ abstracts, and help we have received from colleagues around the world in the successful organization of the 33rd International Ocean and Polar (Arctic) Engineering Conference (ISOPE-2023), Ottawa, Ontario, Canada, June 19–23, 2023. The Conference features 137 sessions of peer-reviewed papers and 4 plenary and keynote presentations from more than 40+ countries, including the ISOPE specialty symposia as a part of the ISOPE-2023 Conference.

The conference program is issued in 2 versions: Session time and rooms printed and full conference program online (www.isope.org).

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 peer-review, establishing high international standards for publication and worldwide distribution, and promoting interdisciplinary interaction between academia and industry.

The International Society of Ocean and Polar Engineers (ISOPE) has already held 65 successful international meetings with all peer-reviewed papers:
- 1st (1990) Pacific/Asia Offshore Mechanics Symposium (PACOMS-90) Seoul; Beijing; Pusan; Daejeon; Vladivostok; Dalian; Bangkok; Busan; Vladivostok; Shanghai; Gold Coast; Jeju Island; Dalian, 2020.
- Annual ISOPE conferences, starting in Edinburgh, 1991, have been held in San Francisco, Singapore, Osaka, The Hague, Los Angeles, Honolulu, Montreal, Brest, Seattle, Stavanger, Kitakyushu, Honolulu, Toulon, Seoul, San Francisco, Lisbon, Vancouver, Osaka, Beijing, Maui, Rhodes, Anchorage, Busan and Hawaii Kona, Rhodes, San Francisco, Sapporo. Honolulu, three Hybrids Since 1992, the annual ISOPE conference program has been the world's largest of its kind with peer-reviewed papers.
- 1st (1995) ISOPE Ocean Mining & Gas Hydrates Symposium (OMHS-95; OMGH), Tsukuba, 1995; Seoul; Goa; Szczecin; Tsukuba; Changsha; Lisbon; Chennai, Szczecin; Kona Hawaii, Sapporo, Honolulu, 2019, and three Hybrids.
- ISOPE HPM (High-Performance Materials) Symposium: Started in Honolulu 2003 and expanded every year with emerging topics.
- ISOPE Series of 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, LH2, LCO2, Smart Ship, AI, NN, CFD,…..

On behalf of the Technical Program Committee, it is our pleasure to welcome participants from all over the world to the ISOPE-2023 Conference in Ottawa, Canada.

Jin S Chung
USA
H Kawai
Japan
Ivana Kubat
Canada

Eva Loukogeorgaki
Greece
Hua Liu
China
Ronald H Knapp
USA

Sa Young Hong
Korea
Decheng Wan
China

Co-chairs of the ISOPE-2023 Conference
**SUNDAY JUNE 18**

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tr>
<td>09:00</td>
<td>ISOPE Board of Directors Meeting</td>
<td>Maple, EF</td>
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<tr>
<td>10:30</td>
<td>ISOPE Executive Committee Meeting</td>
<td>Maple, EF</td>
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<tr>
<td>14:00-17:00</td>
<td>CONFERENCE REGISTRATION</td>
<td>Ballroom Foyer, 4F</td>
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<tr>
<td>17:00-18:00</td>
<td>WELCOME RECEPTION</td>
<td>Governor General, 4F</td>
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</tbody>
</table>

Tour Information: Visit tour desk in Foyer or www.isope.org

**MONDAY JUNE 19**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>07:30</td>
<td>On-Site Registration starts at 07:30</td>
<td>Ballroom Foyer, 4F</td>
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<tr>
<td>07:30</td>
<td>Session Chair/Co-chair Briefing</td>
<td>Ballroom Foyer, 4F</td>
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<tr>
<td>08:30</td>
<td>Conference Opening</td>
<td>Confederation, 4F</td>
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<tr>
<td>08:30</td>
<td>1. Plenary: Low Carbon: ExxonMobil Low Carbon</td>
<td>Confederation, 4F</td>
</tr>
<tr>
<td>10:30</td>
<td>2. RENEWABLE ENERGY I: FOWT 1</td>
<td>Provinces I</td>
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<tr>
<td>10:30</td>
<td>3. AST I: Hydrogen &amp; Nontraditional Propulsion 4</td>
<td>Provinces II</td>
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<tr>
<td>10:30</td>
<td>4. HYDRODYNAMICS I: Intelligent Hydro 1</td>
<td>Ontario</td>
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<tr>
<td>10:30</td>
<td>5. HPM I: Welding 1</td>
<td>Oak</td>
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<tr>
<td>10:30</td>
<td>6. SPRU I: Pipeline 1</td>
<td>Les Saisons</td>
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<tr>
<td>10:30</td>
<td>7. OCEAN TECH I: Offshore Installation, Simulation</td>
<td>Quebec</td>
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<tr>
<td>10:30</td>
<td>8. COASTAL I: Wave Mechanics 1</td>
<td>Newfoundland</td>
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<tr>
<td>10:30</td>
<td>9. OMGH I: Gas Hydrates</td>
<td>Alberta</td>
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<td>10:30</td>
<td>10. POLAR TECH I: Ice and Iceberg 1</td>
<td>Saskatchewan</td>
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<tr>
<td>13:10</td>
<td>Keynote 1: LH2/ and LH2 Carrier (Keynote 1): HySTRA, KHL, Japan</td>
<td>Provinces II</td>
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<tr>
<td>14:00</td>
<td>11. RENEWABLE ENERGY II: FOWT 2</td>
<td>Provinces I</td>
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<tr>
<td>14:00</td>
<td>12. AST II: Propulsion and Energy Management</td>
<td>Provinces II</td>
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<tr>
<td>14:00</td>
<td>13. HYDRODYNAMICS II: Intelligent Hydro 2</td>
<td>Ontario</td>
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<tr>
<td>14:00</td>
<td>14. HPM II: Welding 2</td>
<td>Oak</td>
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<td>14:00</td>
<td>15. SPRU II: Pipeline 2</td>
<td>Les Saisons</td>
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<tr>
<td>14:00</td>
<td>16. OCEAN TECH II: Floating Tunnel and Bridge</td>
<td>Quebec</td>
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<tr>
<td>14:00</td>
<td>17. COASTAL II: Wave Mechanics 2</td>
<td>Newfoundland</td>
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<tr>
<td>14:00</td>
<td>18. OMGH II: Drilling</td>
<td>Alberta</td>
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<tr>
<td>14:00</td>
<td>19. POLAR TECH II: Ice and Iceberg 2</td>
<td>Saskatchewan</td>
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<tr>
<td>16:20</td>
<td>20. RENEWABLE ENERGY III: FOWT 3</td>
<td>Provinces I</td>
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<tr>
<td>16:20</td>
<td>21. AST III: MaTCH I: Materials 1</td>
<td>Provinces II</td>
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<tr>
<td>16:20</td>
<td>22. HYDRODYNAMICS III: Waves and F-S</td>
<td>Ontario</td>
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<tr>
<td>16:20</td>
<td>23. HPM III: Crack, Fracture, Fatigue 1</td>
<td>Oak</td>
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<tr>
<td>16:20</td>
<td>24. SPRU III: Pipeline 3</td>
<td>Les Saisons</td>
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<tr>
<td>16:20</td>
<td>25. OCEAN TECH III: Bottom-Fixed Structures 1</td>
<td>Quebec</td>
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<tr>
<td>16:20</td>
<td>26. COASTAL III: Structures</td>
<td>Newfoundland</td>
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<tr>
<td>16:20</td>
<td>27. OMGH III: Subsea Storage and Cement Slurry 1</td>
<td>Alberta</td>
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<tr>
<td>16:20</td>
<td>28. POLAR TECH III: Arctic Ship Test</td>
<td>Saskatchewan</td>
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</tbody>
</table>

18:30 ISOPE Technical Committee Meetings: Notice on bulletin board New members are welcome.
07:30 Session Chair/Co-chair Briefing  Ballroom Foyer, 4F

08:00
29. RENEWABLE ENERGY IV: FOWT 4  Provinces I
30. AST IV: MaTCH 2: Materials II  Provinces II
31. HYDRODYNAMICS IV: Forces 1  Ontario
32. HPM IV: Crack, Fracture, Fatigue 2  Oak
33. SPRU IV: Pipeline 4  Les Saisons
34. OCEAN TECH IV: Bottom-Fixed Structures 2  Quebec
35. COASTAL IV: AL Remote Sensing  Newfoundland
36. OMGH IV: Subsea Storage and Cement Slurry 2  Alberta
37. POLAR TECH IV: Icebreakers and Operations 1  Saskatchewan

10:30
38. RENEWABLE ENERGY V: FOWT 5  Provinces I
39. AST V: MaTCH 3: Containment System 1  Provinces II
40. HYDRODYNAMICS V: Forces 2  Ontario
41. HPM V: Crack, Fracture, Fatigue 3  Oak
42. SPRU V: Riser 1  Les Saisons
43. OCEAN TECH V: Floating Structures 1  Quebec
44. COASTAL V: Coastal Processes 1  Newfoundland
45. OMGH V: Minerals, Mining/Dredging, Processing  Alberta
46. POLAR TECH V: Icebreakers and Operations 2  Saskatchewan

13:10 Keynote 2
CO2 Ship Transport: Sea River Maritime, Exxomobil, USA  Provinces II

14:00
47. RENEWABLE ENERGY VI: FOWT 6  Provinces I
48. AST VI: MaTCH 4: Containment System 2  Provinces II
49. HYDRODYNAMICS VI: Floating Dynamics 1  Ontario
50. HPM VI: Tubular Structure  Oak
51. SPRU VI: Riser 2  Les Saisons
52. OCEAN TECH VI: Floating Structures 2  Quebec
53. COASTAL VI: Coastal Processes 2  Newfoundland
54. OMGH VI: Hydraulic Dredging and Lifting  Alberta
55. POLAR TECH VI: Polar Workshop  Saskatchewan

16:20
56. RENEWABLE ENERGY VII: FOWT 7  Provinces I
57. AST VII: Navigation and Maneuvering 1  Provinces II
58. HYDRODYNAMICS VII: Floating Dynamics 2  Ontario
59. HPM VII: Environment Assisted Cracking 1: EAC 1  Oak
60. SPRU VII: Subsea  Les Saisons
61. OCEAN TECH VII: FPSO (Floating Structures 3)  Quebec
62. COASTAL VII: Ports & Ships  Newfoundland
63. OMGH VII: Deep Seabed System  Alberta
64. RENEWABLE ENERGY XVI: WEC 2  Saskatchewan

15:30 Awards Committee Meeting  Maple, EF
16:30 Board of Editors Meeting  Maple, EF

19:00 ISOPE-2019 Student Get-together  TBA
19:30 ISOPE-2023/2024 TPC Meeting  TBA

Find Digital Conference Program Updates in  
https://www.isope.org/conferences-symposia-and-workshops/
### WEDNESDAY JUNE 21

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<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>07:30</td>
<td>Session Chair/Co-chair Briefing</td>
<td>Ballroom Foyer, 4F</td>
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<tr>
<td>08:00</td>
<td>65. RENEWABLE ENERGY VIII: FOWT 8</td>
<td>Provinces I</td>
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<tr>
<td>66. AST VIII: Navigation and Maneuvering 2</td>
<td>Provinces II</td>
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<tr>
<td>67. HYDRODYNAMICS VIII: Tsunami and Metocean</td>
<td>Ontario</td>
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<td>68. HPM VIII: Environment Assisted Cracking II: EAC 2</td>
<td>Oak</td>
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<td>69. SPRU VIII: Flow Assurance</td>
<td>Les Saisons</td>
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<tr>
<td>70. OCEAN TECH VIII: Offshore Systems</td>
<td>Quebec</td>
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<tr>
<td>71. HYDRODYNAMICS XVI: VIV 1</td>
<td>Newfoundland</td>
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<tr>
<td>72. AST XVI: Ultimate Strength and Fatigue 1</td>
<td>Alberta</td>
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<tr>
<td>73. RENEWABLE ENERGY XVII: WEC 3</td>
<td>Saskatchewan</td>
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<td>10:30</td>
<td>74. RENEWABLE ENERGY IX: FOWT 9</td>
<td>Provinces I</td>
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<td>75. AST IX: Ship Hull and Optimization 1</td>
<td>Provinces II</td>
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<td>76. HYDRODYNAMICS IX: CFD 1</td>
<td>Ontario</td>
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<tr>
<td>77. MECHANICS I: Structures and Vibration 1</td>
<td>Oak</td>
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<tr>
<td>78. SPRU IX: Flexible/Umbilical</td>
<td>Les Saisons</td>
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<tr>
<td>79. OCEAN TECH IX: Environment and Ecology 1</td>
<td>Quebec</td>
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<tr>
<td>80. HYDRODYNAMICS XVII: VIV 2</td>
<td>Newfoundland</td>
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<tr>
<td>81. AST XVII: Ultimate Strength and Fatigue 2</td>
<td>Alberta</td>
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<tr>
<td>82. RENEWABLE ENERGY XVIII: WEC 4</td>
<td>Saskatchewan</td>
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<tr>
<td>12:00</td>
<td>101. RENEWABLE ENERGY XII: TALOS 1 WED</td>
<td>Provinces I</td>
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<tr>
<td>84. AST X: Ship Hull and Optimization 2</td>
<td>Provinces II</td>
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<tr>
<td>85. HYDRODYNAMICS X: CFD 2</td>
<td>Ontario</td>
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<tr>
<td>86. MECHANICS II: Structures and Vibration 2</td>
<td>Oak</td>
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<tr>
<td>87. SPRU X: Power Cable</td>
<td>Les Saisons</td>
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<tr>
<td>88. OCEAN TECH X: Environment and Ecology 2</td>
<td>Quebec</td>
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<tr>
<td>89. GEOTECH I: Soil Properties and Liquefaction 1</td>
<td>Newfoundland</td>
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<tr>
<td>90. AST XVIII: Soil Properties and Liquefaction 2</td>
<td>Saskatchewan</td>
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<tr>
<td>91. MaTCH 5: H2 and CO2 Workshop</td>
<td>Saskatchewan</td>
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<tr>
<td>16:20</td>
<td>110. RENEWABLE ENERGY XIII: TALOS 2 WED</td>
<td>Provinces I</td>
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<tr>
<td>93. AST XI: Smart Ship Tech 1</td>
<td>Provinces II</td>
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<tr>
<td>94. HYDRODYNAMICS XI: Particle Methods</td>
<td>Ontario</td>
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<td>95. MECHANICS III: Risk and Reliability</td>
<td>Oak</td>
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<tr>
<td>96. UNDERWATER I: Imaging &amp; Acoustics</td>
<td>Les Saisons</td>
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<tr>
<td>97. OCEAN TECH XI: Comparative Study 1</td>
<td>Quebec</td>
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<tr>
<td>98. GEOTECH II: Soil Properties and Liquefaction 2</td>
<td>Newfoundland</td>
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<tr>
<td>99. AST XIX: Resistance, Drag Reduction 2</td>
<td>Alberta</td>
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<tr>
<td>100. UNDERWATER VI: Underwater Workshop</td>
<td>Saskatchewan</td>
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19:00 The 33rd Annual Conference Banquet  
Cultural Event, ISOPE Best Paper, Best Student Paper, Outstanding Student Scholarships, Best Organizer(s) and ISOPE Awards  
*Don’t forget the banquet ticket.*
07:30 Session Chair/Co-chair Briefing
Ballroom Foyer, 4F

08:00
83. RENEWABLE ENERGY X: FOWT 10
Provinces I
102. AST XII: Smart Ship Tech 2
Provinces II
103. HYDRODYNAMICS XII: Sloshing 1
Ontario
104. MECHANICS IV: Collision 1
Oak
105. UNDERWATER II: Vehicle & Hydrodynamics
Les Saisons
106. OCEAN TECH XII: Comparative Study 2: WKSP
Quebec
107. GEOTECH III: Pile and Anchor 1
Newfoundland
108. AST XX: Smart Ship 1
Alberta
109. AST XXIV: AST Workshop
Saskatchewan
10:30
92. RENEWABLE ENERGY XI: Wind Farm
Provinces I
111. AST XIII: Hydrogen & Nontraditional Propulsion Fuel 1
Provinces II
112. HYDRODYNAMICS XIII: Tank Sloshing 2
Ontario
113. MECHANICS V: Collision 2
Oak
114. UNDERWATER III: Vehicle & Strength
Les Saisons
115. OCEAN TECH Workshop
Quebec
116. GEOTECH IV: Pile and Anchor 2
Newfoundland
117. AST XXI: Smart Ship 2
Alberta
118. SPRU XI: SPRU Workshop
Saskatchewan
12:00 Student Forum: adv. reservation required
TBD, 6F

14:00
119. RENEWABLE ENERGY XIV: Tidal Current
Provinces I
120. AST XIV: Hydrogen & Nontraditional Propulsion Fuel 2
Provinces II
121. HYDRODYNAMICS XIV: Tank Sloshing 3
Ontario
122. FOWT Workshop 1
Oak
123. UNDERWATER IV: Vehicle & Control 1
Les Saisons
125. GEOTECH V: Foundation
Newfoundland
126. AST XXII: Cavitation and Cavity 1
Alberta
127. RENEWABLE ENERGY XIX: Renew Workshop
Saskatchewan
16:20
128. RENEWABLE ENERGY XV: WEC 1
Provinces I
129. AST XV: Hydrogen & Nontraditional Propulsion Fuel 3
Provinces II
130. HYDRODYNAMICS XV: Sloshing 4
Ontario
131. FOWT Workshop 2
Oak
132. UNDERWATER V: Vehicle & Control 2
Les Saisons
133. HYDRODYNAMICS XVIII: Hydro Workshop
Quebec
134. GEOTECH VI: Pipe-Soil
Newfoundland
135. AST XXIII: Cavitation and Cavity 2
Alberta
136. HPM XIII: HPM Workshop
Saskatchewan

Sunday – Friday
Author Practice
Individual Session rooms
On-site Registration
Ballroom Foyer, 4F
ISOPE Headquarters
Nunavut, 4F
Proceedings and Badge Pickup
Registration, Ballroom Foyer, 4F
Award, Editors Committee Meetings
Maple, E F

Tours (TBA)
https://www.isope.org/conferences-symposia-and-workshops/
This 33rd annual ISOPE conference features 137 technical and opening general sessions, 4 plenary presentation and keynote presentations from top experts from industry, academia and government. After peer review of the manuscripts selected from 1,000+ abstracts, 590 peer-reviewed-papers and additional 10+ presentations only are accepted and discussions by researchers, engineers and managers from 40+ countries. 590 for the Conference Proceedings, The ISOP580 E-2023 Conference Proceedings with peer-reviewed papers in PDF files will be available in a set of 4 volumes on USB (4,000 pp.) — paginated — during the conference and later for worldwide post-conference order from ISOPE: ISBN 978-1-880653-80-7; ISSN 1098-6189. Individual papers from www.onepetro.org /ISOPE and directly ISOPE and more. Only the changes in titles or authors the Technical Program Committee received in writing before May 1, 2023 are reflected in this program. Final update is reflected in the Final Program.

All ISOPE publications are indexed by Engineering Index, EI Compendex, Google Scholar, Scopus, Scientific and Technical Proceedings (ISTP/ISI), Web of Science and others.

FULL CONFERENCE PROGRAM WITH SESSION / PAPER LIST: Updates at https://www.isope.org/conferences-symposia-and-workshops/

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Past President: Eva Loukogeorgaki, Greece
Executive Director: Jin S Chung, USA
Executive Committee: Jin S Chung, Ronald H Knapp, Wan C Kan, USA, H W Jin, USA, President John M Niedzwecki, USA

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Members are listed in digital version of the program on https://www.isope.org/conferences-symposia-and-workshops/
SESSION LIST BY TOPICS

ISOPE (05/01/2023)

1 Conference Opening

Opening / Plenary Session
Low Carbon (tentative),
Speaker TBA, ExxonMobil Low Carbon Solutions, USA

Keynote 1 Monday 13:10
Suiso Frontier, the First LH2 Carrier – Demonstration of Technologies and into Operational Phase
Yukichi Takaoka, HySTRA, Japan and Kentarou Mizumukai, Yuichi Kameno, Kawasaki Heavy Industries, Japan

Keynote 2 Tuesday 13:10
LCO2 Ship Transport
Jesse Senkel, SeaRiver Maritime, USA

Keynote 3 Wednesday
Transition to Renewable Energies with focus on Hydrogen in Germany
Samar Ensenbach, GEOMAR Helmholtz Centre For Ocean Research; Andre Baeten, Somayeh Baeten, Augsburg University of Applied Sciences, Germany

OCEAN MINING, DREDGING, HYDRATES, DRILLING/CEMENTING

9. OMGH I: Gas Hydrates
18. OMGH II: Drilling
27. OMGH III: Subsea Storage and Cement Slurry 1
36. OMGH IV: Subsea Storage and Cement Slurry 2
45. OMGH V: Minerals, Mining/Dredging, Processing
54. OMGH VI: Hydraulic Dredging and Lifting
63. OMGH VII: Deep Seabed System

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2. RENEWABLE ENERGY I: FOWT 1
11. RENEWABLE ENERGY II: FOWT 2
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65. RENEWABLE ENERGY VIII: FOWT 8
74. RENEWABLE ENERGY IX: FOWT 9
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92. RENEWABLE ENERGY XI: Wind Farm
101. RENEWABLE ENERGY XII: TALOS 1
110. RENEWABLE ENERGY XIII: TALOS 2
119. RENEWABLE ENERGY XIV: Tidal Current
122. FOWT Workshop 1
131. FOWT Workshop 2
25. OCEAN TECH III: Bottom-Fixed Structures 1
34. OCEAN TECH IV: Bottom-Fixed Structures 2
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70. OCEAN TECH VIII: Offshore Systems
79. OCEAN TECH IX: Environment and Ecology 1
88. OCEAN TECH X: Environment and Ecology 2
97. OCEAN TECH XI: Comparative Study 1
106. OCEAN TECH XII: Comparative Study 2: Workshop

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98. GEOTECH II: Soil Properties and Liquefaction 2
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116. GEOTECH IV: Pile and Anchor 2
125. GEOTECH V: Foundation
134. GEOTECH VI: Pipe-Soil

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6. SPRU I: Pipeline 1
15. SPRU II: Pipeline 2
24. SPRU III: Pipeline 3
33. SPRU IV: Pipeline 4
42. SPRU V: Riser 1
51. SPRU VI: Riser 2
60. SPRU VII: Subsea
69. SPRU VIII: Flow Assurance
78. SPRU IX: Flexible/Umbilical
87. SPRU X: Power Cable
118. SPRU XI: SPRU Workshop

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105. UNDERWATER II: Vehicle & Hydrodynamics
114. UNDERWATER III: Vehicle & Strength
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132. UNDERWATER V: Vehicle & Control 2
100. UNDERWATER VI: Underwater Workshop

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19. POLAR TECH II: Ice and Iceberg 2
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37. POLAR TECH IV: Icebreakers and Operations 1
46. POLAR TECH V: Icebreakers and Operations 2
55. POLAR TECH VI: Polar Workshop

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22. HYDRODYNAMICS III: Waves and F-S
31. HYDRODYNAMICS IV: Forces 1
40. HYDRODYNAMICS V: Forces 2
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58. HYDRODYNAMICS VII: Floating Dynamics 2
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26. COASTAL III: Structures
35. COASTAL IV: AI, Remote Sensing
44. COASTAL V: Coastal Processes 1
53. COASTAL VI: Coastal Processes 2
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14. HPM II: Welding 2
23. HPM III: Crack, Fracture, Fatigue 1
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50. HPM VI: Tubular Structure
59. HPM VII: Environment Assisted Cracking I: EAC 1
68. HPM VIII: Environment Assisted Cracking II: EAC 2
136. HPM XIII: HPM Workshop

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86. MECHANICS II: Structures and Vibration 2
95. MECHANICS III: Risk and Reliability
104. MECHANICS IV: Collision 1
113. MECHANICS V: Collision 2
ADVANCED SHIP TECHNOLOGY (AST)

3. AST I: Hydrogen & Nontraditional Propulsion 4
12. AST II: Propulsion and Energy Management
21. AST III: MaTCH 1: Materials 1
30. AST IV: MaTCH 2: Materials II
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48. AST VI: MaTCH 4: Containment System 2
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