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June 10–15, Sapporo, Japan

The Twenty-eighth (2018) International  
**Ocean and Polar  
Engineering Conference**  
(Offshore and Polar Engineering Conference)

Including *additional ISOPE symposia:*

1st Environment-Assisted Cracking  
3rd Underwater Technology  
7th Tsunami & Safety  
8th Asset Integrity  
9th Arctic Science & Technology  
8th Arctic & Cryogenic Materials  
9th Renewable Energy & Environment  
10th Sloshing Dynamics & Design  
LNG Membrane, Processing, Bunkering  
13th Ocean Mining & Gas Hydrates Symposium  
16th High-Performance Materials

**ISOPE-2018**

Sapporo, Japan, June 10-15

(As of April 26, 2018)

## Technical Program

Refereed papers from 50+ countries in 151 technical general  
3 Plenary and 5 keynote and multiple Focus sessions  
Full Program with General Information, Advance Registration and Venue  
Hotel, Paper List, Reservations, and Updates on  
<http://www.isopec.org/conferences/conferences.htm>  
ISOPE-2017 Conference proceedings  
ISBN 978-1-880653-97-5; ISSN 1098-6189  
All ISOPE Publications:  
<http://www.isopec.org/publications/publications.htm>

*Organized by:*

Technical Program Committee, ISOPE

*Sponsored by:*

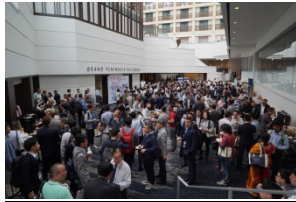
International Society of Offshore and Polar Engineers (ISOPE)  
With cooperating organizations (listed inside)



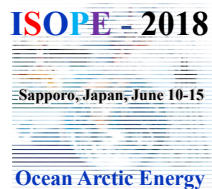
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Opening session, Tea Break, Banquet  
at ISOPE-2017 San Francisco



## ISOPE-2018 Sapporo

The 28th Annual International Ocean and Polar Engineering  
Conference, Sapporo, Japan, June 10-15, 2018

### Online Hotel Room Reservation Link:

<http://www.jtb.co.jp/ripple/isope2018/>

*Expanded Session List and Full Program (digital)  
with Paper List: Download from*

[www.isope.org](http://www.isope.org) or

<http://www.isope.org/conferences/conferences.htm>

Full Program (Session and Paper List) and Update:

<http://www.isope.org/conferences/conferences.htm>; Questions to  
[meetings@isope.org](mailto:meetings@isope.org)

ISOPE Journal and Conference Proceedings and Order Form:

<http://www.isope.org/publications/publications.htm>

28th Annual ISOPE–2018 Conference, Sapporo, Japan, June  
10–15, 2018

12th ISOPE Ocean Mining and Gas Hydrates Symposium  
(OMS/ OMGH-2018), Sapporo, Japan, June 10-15, 2018

13th ISOPE PACOMS-2018 Symposium, Jeju Island, Korea,  
October 14-17, 2018

## Welcome to the ISOPE-2018 Conference

We greatly appreciate the excellent response, with **1300+** abstracts, and help we have received from colleagues around the world in the successful organization of the 28th International Ocean and Polar Engineering Conference (**ISOPE-2018**), Sapporo, Japan, June 10–15, 2018. The Conference features **151** sessions of peer-reviewed papers and 9 plenary and keynote presentations from more than **50+** countries, including the ISOPE specialty symposia as a part of the ISOPE-2018 Conference.

The conference program is issued in 2 versions: Session time and rooms printed and full conference program online ([www.isopec.org](http://www.isopec.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 rigorous 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 58 successful international meetings with all peer-reviewed papers:

- 1st (1990) European Offshore Mechanics Symposium (**EUROMS-90**) Trondheim; EUROMS-99 Moscow; EUROMS-2012 Istanbul.
- 1st (1990) Pacific/Asia Offshore Mechanics Symposium (**PACOMS-90**) Seoul; Beijing; Pusan; Daejeon; Vladivostok; Dalian; Bangkok; Busan; Vladivostok; Shanghai; Gold Coast, Australia, 2016 .
- **Annual ISOPE conferences**, starting in Edinburgh, 1991, have been held in San Francisco, Singapore, Osaka, The Hague, Los Angeles, Honolulu, Montréal, Brest, Seattle, Stavanger, Kitakyushu, Honolulu, Toulon, Seoul, San Francisco, Lisbon, Vancouver, Osaka, Beijing, Maui, Rhodes, Anchorage, Busan and Hawaii Kona, Rhodes, San Francisco. 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 (**OMS-95; OMGH**), Tsukuba, 1995; Seoul; Goa; Szczecin; Tsukuba; Changsha; Lisbon; Chennai, Szczecin; Kona Hawaii, Sapporo, 2018.
- 1st (1996) International Deep-Ocean Technology (**IDOT-96**) Symposium and Workshop, 1996 Los Angeles 1996; Stavanger, 2001; Beijing 2009.
- **ISOPE HPM (High-Performance Materials) Symposium**: Started in Honolulu 2003 and expanded every year with emerging topics.
- **ISOPE Series of specialty symposia**: **ANGT**: Strain-Based Design SBD; Nanotechnology NANOS; Frontier Energy; Sloshing & Dynamics; Renewable Energy/Environment; Tsunami; Arctic Sci & Tech; Arctic Materials; Asset Integrity; High-Mn/Cryogenic Materials; Materials Reliability.

On behalf of the Technical Program Committee, it is our pleasure to welcome participants from all over the world to the ISOPE-2019 Conference in beautiful Honolulu, Hawaii, USA.

Hiroimitsu Kitagawa  
Japan  
Ronald H Knapp  
USA

Demos Angelides  
Greece  
Seok-Won Hong  
Korea

Jin S Chung,  
USA  
Hyun Woo Jin  
USA

Co-chairs of the ISOPE-2018 Conference

**SUNDAY JUNE 10**

09:00 ISOPE Board of Directors Meeting Crystal D, 2F  
10:30 ISOPE Executive Committee Meeting Crystal D, 2F  
EUROMS and PACOMS Executive Committees  
15:00-18:00  
**CONFERENCE REGISTRATION** Foyer, 3F  
17:00-18:00  
**WELCOME RECEPTION** Royton Hall, 3F

Tour Information Visit tour desk in Foyer or [www.isope.org](http://www.isope.org)

**MONDAY JUNE 11**

On-Site Registration starts at 07:30 Foyer, 3F  
07:30 Session Chair/Co-chair Briefing Foyer, 3F  
  
08:30 Conference Opening Royton Hall, 3F  
08:30  
1. OCEAN, ARCTIC, ENERGY: REVIEW (2018) Royton Hall  
  
10:30  
2. HYDRO I: Comparative Study Room 1  
3. SLOSHING I: Physics Room 2  
4. RENEWABLE I: Support Structures Room 3  
5. VORTEX-INDUCED VIBRATIONS I Room 4  
6. ASSET INTEGRITY I: Fracture, Fatigue Mgmt Room 5  
7. ENVIRONMENT I: Environ Monitoring, Red Tide Room 6  
8. OCEAN TECH I: Floatover Installation 1 Room 7  
9. MECHANICS, IMPACT, SAFETY I: Mechanics 1 Room 8  
10. GEOTECH I: Suction Piles Room 9  
11. UNDERWATER TECH I: Sensors, Observation Room 10  
  
13:10 Room 4  
Keynote Sea Ice Research .....(Ed Ross) Room 10  
Keynote Wind Turbine Structure (L-B Kramer)  
  
14:00  
12. HYDRO II: Impact, Hydroelasticity 1 Room 1  
13. SLOSHING II: Experiments Room 2  
14. RENEWABLE II: Foundations Room 3  
15. VORTEX-INDUCED VIBRATIONS II Room 4  
16. ASSET INTEGRITY II: Corrosion Management Room 5  
17. ENVIRONMENT II: CO<sub>2</sub> Emission, Water Quality Room 6  
18. OCEAN TECH II: Floatover Installation 2 Room 7  
19. MECHANICS, IMPACT, SAFETY II: Mechanics 2 Room 8  
20. GEOTECH II: Foundation 1 Room 9  
21. UNDERWATER TECH II: Acoustics, Communication Room 10  
  
16:20  
22. HYDRO III: Impact, Hydroelasticity 2 Room 1  
23. SLOSHING III: Sloshing-Structure Interactions Room 2  
24. RENEWABLE III: Floating, Substructures Room 3  
25. VORTEX-INDUCED VIBRATIONS III Room 4  
26. HPM I: Advanced Materials 1 Room 5  
27. COASTAL I: Wave Mechanics 1 Room 6  
28. OCEAN TECH III: Floatover Installation 3 Room 7  
29. MECHANICS, IMPACT, SAFETY III: Explosion Room 8  
30. GEOTECH III: Foundation 2 Room 9  
31. UNDERWATER TECH III: ROV Room 10  
  
18:30 ISOPE Technical Committee Meetings: Notice on bulletin board  
New members are welcome.

**TUESDAY JUNE 12**

07:30 Session Chair/Co-chair Briefing	Foyer, 3F
<b>08:00</b>	
32. HYDRO IV: Ship Added Resistance	Room 1
33. SLOSHING IV: Assessment	Room 2
34. RENEWABLE IV: Aerodynamics	Room 3
35. VORTEX-INDUCED VIBRATIONS IV	Room 4
36. HPM II: Advanced Materials 2	Room 5
37. COASTAL II: Wave Mechanics 2	Room 6
38. OCEAN TECH IV: Subsea Systems	Room 7
39. MECHANICS, IMPACT, SAFETY IV: Safety	Room 8
40. GEOTECH IV: Spudcan, Pipeline	Room 9
41. UNDERWATER TECH IV: AUV Design	Room 10
<b>10:30</b>	
42. HYDRO V: Ship Drag Reduction	Room 1
43. SLOSHING V: Sloshing Mitigation	Room 2
44. RENEWABLE V: Offshore Wind Simulations	Room 3
45. SUBSEA, PIPELINES, RISERS I: Flexibles, Umbilicals	Room 4
46. HPM III: Composite Materials	Room 5
47. COASTAL III: Storm Surge	Room 6
48. OCEAN TECH V: LNG Process, Bunkering 1	Room 7
49. MECHANICS, IMPACT, SAFETY V: Impact 1	Room 8
50. GEOTECH V: Computational Modeling	Room 9
51. UNDERWATER TECH V: AUV Control	Room 10
<b>13:10</b>	
<b>Prof. Jin S Chung Award and Lecture (O T Gudmestad)</b>	<b>Room 1</b>
<b>14:00</b>	
52. HYDRO VI: Ship Seakeeping	Room 1
53. ARCTIC I: Ice Cover Mechanics	Room 2
54. RENEWABLE VI: Wind Turbine 1	Room 3
55. SUBSEA, PIPELINES, RISERS II: Riser Design 1	Room 4
56. HPM IV: Fatigue, Fracture	Room 5
57. COASTAL IV: Structures 1	Room 6
58. OCEAN TECH VI: LNG Process, Bunkering 2	Room 7
59. MECHANICS, IMPACT, SAFETY VI: Impact 2	Room 8
60. GEOTECH VI: Geohazards, Liquefaction	Room 9
61. UNDERWATER TECH VI: Robotics, Propulsion	Room 10
<b>16:20</b>	
62. HYDRO VII: Loads, Responses 1	Room 1
63. TSUNAMI I	Room 2
64. RENEWABLE VII: Wind Turbine 2	Room 3
65. SUBSEA, PIPELINES, RISERS III: Riser Design 2	Room 4
66. HPM V: Shipbuilding Steels	Room 5
67. COASTAL V: Structures 2	Room 6
68. OCEAN TECH VII: VLFS, TLP, TRUSS	Room 7
69. ADVANCED SHIP TECH I: Ultimate Strength	Room 8
70. GEOTECH VII: Soil Property, Mechanics I	Room 9
71. ARCTIC II: Arctic Ship Design	Room 10
15:30 Awards Committee Meeting	Crystal D, 2F
16:30 Board of Editors Meeting	Crystal D, 2F
19:00 ISOPE-2018 Student Get-together	TBA
19:30 ISOPE-2018 Sapporo/2019 Honolulu TPC Meeting	TBA

Find Digital Conference Program Updates in  
<http://www.isopec.org/conferences/conferences.htm>

**WEDNESDAY JUNE 13**

<b>07:30</b>	<b>Session Chair/Co-chair Briefing</b>	Foyer, 3F
<b>08:00</b>		
72.	HYDRO VIII: Loads, Responses 2	Room 1
73.	TSUNAMI II	Room 2
74.	RENEWABLE VIII: Wind Installations	Room 3
75.	SUBSEA, PIPELINES, RISERS IV: Flow Assurance	Room 4
76.	HPM VI: Offshore Structures	Room 5
77.	COASTAL VI: Structures 3	Room 6
78.	OCEAN TECH VIII: Floating Dynamics	Room 7
79.	ADVANCED SHIP TECH II: Hull Optimization	Room 8
80.	IOR, Energy Storage	Room 9
81.	ARCTIC III: Navigation in Ice	Room 10
<b>10:30</b>		
82.	HYDRO IX: Rolling, Multi Body	Room 1
83.	TSUNAMI III	Room 2
84.	RENEWABLE IX: Wave Energy 1	Room 3
85.	SUBSEA, PIPELINES, RISERS V: Pipeline 1	Room 4
86.	HPM VII: Advances in Welding	Room 5
87.	COASTAL VII: Sediment Transport/Coastal Erosion 1	Room 6
88.	OCEAN TECH IX: Mooring Dynamics	Room 7
89.	ADVANCED SHIP TECH III: Navigation, Control 1	Room 8
90.	OMGH I: DEEP OCEAN MINING 1 –Mineral, Environ 1	Room 9
91.	ARCTIC IV: Ice Structure Interaction	Room 10
<b>12:00</b>	<b>ISOPE Board of Directors Meeting III</b>	Crystal D, 3F
<b>13:10</b>		
	<b>Keynote: LNG Containment System... (GTT): Cancelled</b>	Room 2
	<b>Keynote: Large-Scale Plant in the Arctic... (S Abe)</b>	Room 7
<b>14:00</b>		
92.	TSUNAMI IV: Panel	Room 1
93.	HYDRO X: MetOcean 1	Room 2
94.	RENEWABLE X: Wave Energy 2	Room 3
95.	SUBSEA, PIPELINES, RISERS VI: Pipeline 2	Room 4
96.	ENVIRON-ASSISTED CRACKING I: Sour Service...	Room 5
97.	COASTAL VIII: Sediment Transport/Coastal Erosion 2	Room 6
98.	OCEAN TECH X: FPSO	Room 7
99.	ADVANCED SHIP TECH IV: Navigation, Control 2	Room 8
100.	OMGH II: DEEP OCEAN MINING 2 –Mineral, Envi 2	Room 9
101.	ARCTIC V: Arctic Environment	Room 10
<b>16:20</b>		
102.	HYDRO XI: Comparative Study Panel	Room 1
103.	HYDRO XVI: Wave Mechanics 3	Room 2
104.	RENEWABLE XI: Wave Energy 3	Room 3
105.	SUBSEA, PIPELINES, RISERS VII: Pipeline 3	Room 4
106.	ENVIRON-ASSISTED CRACKING II: Hydrogen...	Room 5
107.	COASTAL IX: Sediment Transport/Coastal Erosion 3	Room 6
108.	OCEAN TECH XI: Jackup & Installation	Room 7
109.	ADVANCED SHIP TECH V: Powering 1	Room 8
110.	OMGH III: DEEP OCEAN MINING 3 – Systems 1	Room 9
111.	ARCTIC VI: Ice Management, Station-keeping	Room 10



<b>19:00</b>	<b>Royton Hall</b>
<b>The 28th Annual Conference Banquet</b>	
Cultural Event, ISOPE Best Paper, Best Student Paper, Outstanding Student Scholarships, Best Organizer(s) and ISOPE Awards	
<i>Don't forget the banquet ticket.</i>	

**THURSDAY JUNE 14**

<b>07:30</b>	<b>Session Chair/Co-chair Briefing</b>	Foyer, 3F
<b>08:00</b>		
112.	HYDRO XII: MetOcean 2	Room 1
113.	HYDRO XVII: CFD 1-Applications	Room 2
114.	RENEWABLE XII: Wave Energy 4	Room 3
115.	SUBSEA, PIPELINES, RISERS VIII: Pipeline 4	Room 4
116.	ENVIRON-ASSISTED CRACKING III: Hydrogen...	Room 5
117.	COASTAL X: Reef Islands	Room 6
118.	OCEAN TECH XII: Offshore, Aquaculture	Room 7
119.	ADVANCED SHIP TECH VI: Powering 2	Room 8
120.	OMGH IV: DEEP OCEAN MINING 4 – Systems 2	Room 9
121.	ARCTIC VII: Safety in Operations	Room 10
<b>10:30</b>		
122.	HYDRO XIII: Nonlinear Wave	Room 1
123.	HYDRO XVIII: CFD 2-FSI/WSI 1	Room 2
124.	RENEWABLE XIII: Resources	Room 3
125.	OMGH V: GAS HYDRATES 1: Fundamental	Room 4
126.	HPM VIII: Arctic, Cryogenic Materials	Room 5
127.	COASTAL XI: Ships & Harbors	Room 6
128.	OCEAN TECH XIV: CCP-WSI Blind Tests 1	Room 7
129.	ADVANCED SHIP TECH VII: Powering 3	Room 8
130.	GEOTECH VIII: Soil Property, Mechanics 2	Room 9
131.	ARCTIC VIII: Ice Loads on Ships	Room 10
<b>12:00</b>	<b>Student Forum: adv. reservation required.</b>	Crystal D, 3F
<b>13:10</b>		
	<b>Keynote: Methane Hydrates MH21 (Y Masuda)</b>	Room 4
	<b>Keynote: Renewable Energy - Russian Arctic (V Pavlenko)</b>	Room 3
<b>14:00</b>		
132.	HYDRO XIV: Wave Mechanics 1	Room 1
133.	HYDRO XIX: CFD 3-FSI/WSI 2	Room 2
134.	RENEWABLE XIV: Hybrid, Thermal Systems	Room 3
135.	OMGH VI: GAS HYDRATES 2: Production Funda.	Room 4
136.	HPM IX: Developments in Materials Panel	Room 5
137.	COASTAL XII: Coastal Management 1	Room 6
138.	OCEAN TECH XV: CCP-WSI Blind Tests 2	Room 7
139.	OCEAN TECH XIII: Structural Health, Monitoring	Room 8
140.	GEOTECH IX: Ground Improvement, Soft Soil	Room 9
141.	ARCTIC IX: Arctic Monitoring	Room 10
<b>16:20</b>		
142.	HYDRO XV: Wave Mechanics 2	Room 1
143.	HYDRO XX: CFD Panel	Room 2
144.	RENEWABLE XV: Tidal, Current Energy	Room 3
145.	OMGH VII: GAS HYDRATES 3 - CO <sub>2</sub> Storage	Room 4
146.	UNDERWATER TECH VII: Panel	Room 5
147.	COASTAL XIII: Coastal Management 2	Room 6
148.	OCEAN TECH XVI: CCP-WSI Blind Tests 3	Room 7
149.	ADVANCED SHIP TECH VIII: Ship Production	Room 8
150.	GEOTECH X: Panel	Room 9
151.	ARCTIC X: Panel	Room 10



Sunday – Friday	
Author Practice	Individual session rooms
On-site Registration	Foyer, 3F
ISOPE Headquarters	Emerald, 2F
Proceedings Pickup	Registration Desk, Foyer, 3F
Award, Editors Committee Meetings	Crystal D, 3F

Tours: Click on [General Information](http://www.isope.org/conferences/conferences.htm)  
<http://www.isope.org/conferences/conferences.htm>

# TECHNICAL PROGRAM

## ISOPE-2018 Sapporo, Japan The Twenty-eighth (2018) International Ocean and Polar Engineering Conference Sapporo, Japan, June 10–15, 2018



This 28th annual conference features **151** technical and opening general sessions, **8** plenary presentation and keynote presentations from top experts from industry, academia and government. After peer review of the manuscripts selected from **1,450+** abstracts, **700+** peer-reviewed-papers will be presented and discussed by researchers, engineers and managers from more than **50+** countries. The ISOPE-2018 Conference Proceedings with peer-reviewed papers in PDF files will be available in a set of 4 volumes on **USB (4,900 pp. est.)** – paginated– during the conference and later for worldwide post-conference order from ISOPE: ISBN 978-1-880653-87-6; ISSN 1098-6189. The number at end of the session title indicates the tentative number of the proceedings volume. Only the changes in titles or authors the Technical Program Committee received in writing before **April 26, 2018** are reflected in this program. Final corrections will be updated in the Conference Proceedings of peer-reviewed papers and 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:

Updated at

<http://www.isope.org/conferences/conferences.htm>

<http://www.isope.org/publications/publications.htm>

**2018 Jin S Chung Award Lecture**

Tuesday 13:10

**3 Plenary and 6 keynote Presentations**  
Monday, Tuesday, Wednesday, Thursday

**SATURDAY, June 9**

**Board of Directors: Annual Meeting I**

16:00

TBA

**SUNDAY, June 10**

**Board of Directors: Annual Meeting II**

09:00

Crystal D, 3F

**Welcome Reception**

17:00

Royton Hall, 3F

**MONDAY, June 11**

**Monday Session Chair Briefing**

07:30

Foyer, 3F

**Conference Opening Ceremony**

08:30

Royton Hall, 3F

**Opening Plenary Presentations**



**Plenary 1**  
**Global Energy Outlook and Its Implications**  
Jeffrey M. Grenda,, ExxonMobil Research & Engineering, USA

**Plenary 2**  
**Floatover Installation Technology in South China Sea**  
Xiaojian Jin, CNOOC-COOEC, China Offshore Oil Engineering, China

**13:10 Keynote 1**  
**Sea Ice Research: Recent Findings and Outstanding Issues in Relation to Arctic Development**  
David Fissel, Ed Ross, ASL Environmental Sciences, Inc, Canada

**13:10 Keynote 2**  
**Status & Outlook for Offshore Bottom Fixed Wind Turbine Support Structures**  
Laurent-Baudoin Kramer, OWEC Tower AS, Norway

**Select Focus Sessions**  
Float-over Installation , South China Sea  
Hydrodynamics Comparative Study  
LNG, LNG Bunkering, LNG Storage and FLNG  
Sloshing in LNG, Aerospace and Hydrogen Car Industries,  
Vortex-Induced Vibrations

**ISOPE Technical Committee Meetings**  
18:30 Notice on bulletin board

## **TUESDAY, June 12**

**Tuesday Session Chair Briefing**  
07:30 Foyer, 3F

13:10 **Prof. Jin S. Chung Award and Lecture: 2018**  
**Technological Challenges Related to Sustainable Use of the Arctic Seas**  
Prof. Ove T Gudmestad, Univ of Stavanger, Norway

**Select Focus Sessions**  
LNG, LNG Bunkering and Storage  
DP Floatover Design, Floatover Installation  
AUV, Robotics

15:30 Crystal D, 3F

**Awards Committee Meeting**  
16:30 Crystal D, 3F

**Board of Editors: IJOPE**  
19:30 TBA

**ISOPE-2018/2019 TPC Meeting**  
18:30 tentative time TBA

**Student Get-together: Time**

## **WEDNESDAY, June 13**

**Wednesday Session Chair Briefing**  
07:30 Foyer, 3F

**13:10...Keynote 3**  
~~Cancelled: Membrane Containment System: A Relevant Solution for LNG as Fuel Marine Applications~~  
~~Manager, LNG as Fuel, GTT, France~~

**13:10 Keynote 4**  
**A Large-Scale Plant Construction and Transportation in the Arctic Region**  
Shigeru Abe, JGC Corporation, Japan

**Select Focus Sessions**

FLNG Dynamics, Hydroelasticity, Added Resistance  
Environment Assisted Crack  
Deep Ocean Mining

**The 28th Annual ISOPE Conference Banquet**

19:00 Royton Hall, 3F

**THURSDAY, June 14**

**Thursday Session Chair Briefing**

07:30 Foyer, 3F

**12:00 Student Forum**

**13:10 Keynote 5**

**Recent Status of Methane Hydrate R&D Program in Japan**  
Yoshihiro Masuda, Univ of Tokyo, Japan

**13:10 Keynote 6**

**The Prospects for Large-scale Use of Resources Renewable Energy in the Russian Arctic**  
V I Pavlenko, S Yu Kutsenko, Russian Academy of Sciences, Russia

**Select Focus Sessions**

Gas Hydrates, CCP  
Floatover Installation, Lingshui 17-2 Deepwater Development  
CCP Blind Tests, Comparative Study  
13th ISOPE Student Forum 12:00 Requires advance reservation.

**FRIDAY, June 15**

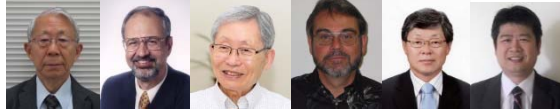
**TOURS and OTHERS.** See Updated Full Program on  
<http://www.isope.org/conferences/conferences.htm> : Advance reservation required.



Presentations at ISOPE-2017 San Francisco Banquet  
**Awards:** Scholarships, ISOPE Board, Jin S Chung Award, Best Paper, Best Student Paper, 2016 Best Papers, 2017 Best Student Paper

**ISOPE-2018 Conference Co-chair**

Hiromitsu Kitagawa, Demos Angelides, Greece; Jin S Chung, USA; Ronald Knapp, USA; Seok Won Hong, Korea; HW Jin (USA);



Kitagawa Angelides Chung Knapp Hong Jin

**ISOPE-2017 San Francisco Conference Secretariat:** ISOPE, USA  
**ISOPE-2018 Sapporo Conference Local Committee:** ISOPE, USA

**ISOPE-2018 Corporate Members and Sponsors: (March 12)**  
**Additional sponsors/supporters on the updated program and online.**



**International Society of Ocean and Polar Engineers (ISOPE)**

**President** (2016–2018): Hyun Woo Jin, USA

**Past President:** Demos Angelides, Greece

**Executive Director:** Jin S Chung, USA

**Executive Committee:** Jin S Chung, Raghavan Ayer, Ronald H Knapp, Wan C Kan, USA, President Hyun Woo Jin, USA, Past President Demos Angelides, Greece

*List of ISOPE Board of Directors, Officers Technical Program Committee members and Cooperating Organizations are listed on <http://www.isopec.org/conferences/conferences.htm>.*

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**ISOPE Cooperating Organizations and  
ISOPE-2018 Technical Program Committee**

Members are listed in digital version of the program on <http://www.isopec.org/conferences/conferences.htm>.

## ISOPE-2018 Sapporo Conference

### SESSION LIST BY TOPICS



OCEAN, ARCTIC, ENERGY: REVIEW Royton Hall, 3F  
(Oral Presentations Only)

#### IOR AND ENERGY STORAGE (Vol. 1)

80. IOR, Energy Storage Room 9

#### 13th OCEAN MINING AND GAS HYDRATES SYMPOSIUM (Vol. 1)

90. OMGH I: DEEP OCEAN MINING 1 –Mineral, Environ 1 Room 9  
100. OMGH II: DEEP OCEAN MINING 2 - Mineral, Enviro 2 Room 9  
110. OMGH III: DEEP OCEAN MINING 3 – Systems, Tech 1 Room 9  
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