

Report of The 3rd NPARC 2016 Meeting in Sapporo

～ Sustainable use of the Arctic ～



Date : July 5th 2016, 10:00～16:20

Venue : Hokkaido University Centennial Hall

Organized by North Pacific Arctic Research Community (NPARC)

Secretariat : Korea Maritime Institute (KMI)

Hosted by Cold Region Port and Harbor Engineering Research Center (CPC)

Under the joint auspices of

The Arctic Research Center of Hokkaido University (ARC)

The Overseas Coastal Area Development Institute of Japan (OCDI)

and Hokkaido International Exchange and Cooperation Center (HIECC)

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1, Program

North Pacific Arctic Research Community 2016 Meeting in Sapporo
~ Sustainable use of the Arctic ~

Program

Date : July 5th 2016, 10:00~16:20

Venue : Hokkaido University Centennial Hall

(Kita-ku, Kita-8jo, Nishi-6chome, Sapporo, Japan)

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Opening Ceremony

- 10:00-10:10 Opening address by Hiroshi Saeki (Chairperson of the CPC) and Sung Gwi Kim (President of KMI)
- 10:10-10:20 Introductions of participants by Noriaki Kawai(Director General of the CPC)
- 10:20-10:35 Photo session

Sessions

- 10:35-11:20 **Keynote Speeches** (Chair : Ryuichi Kuwajima, OCDI)
- Keynote-1: KIM, Jong-Deog(Justin) (KMI)
“Recent Korea’s Arctic Initiatives”
- Keynote-2: Yasushi Fukamachi (The Arctic Research Center of Hokkaido University(ARC))
“Arctic Research Center of Hokkaido University and Japanese Arctic Research”
- Keynote-3: YANG Jian (Shanghai Institutes for International Studies (SIIS))
“The Asian Countries and the Arctic Future”
- 11:20-11:30 Tea break
- 11:30-12:30 **Session-2: China’s Activities on Arctic Research**
- Chair: Natsuhiko Otsuka (CPC, ARC)
- (1) Xu Hua(China Waterborne Transport Research Institute WTI)
“Study on the competitiveness of icebreaker tariffs of the NSR”
- (2) Zhang Yao(Shanghai Institutes for International Studies SIIS)
“Opportunity and Prospect of Trilateral Arctic Cooperation between China, Japan and Korea”
- (3) Cheng Baozhi (Shanghai Institutes for International Studies SIIS)
“Recent Development on China’s Policy towards Arctic Governance”
- 12:30-13:30 **Lunch**
- 13:30-14:30 **Session-3: Korean Activities on Arctic Research**
- Chair : Sung Jin Kim(SNU)
- (1) Wooik Choi and Seungdo Ra(Institute of Russian Studies(IRS), Hankuk University of Foreign Studies(HUFS))
“IRS Arctic Research: Scopes and Perspectives”
- (2) Kang, KukJin (Korea Research Institute of Ships and Ocean Engineering(KRISO))
“Recent Research Status of KRISO Ice Tank”

(3) Hyun-Soo Kim(Inha Technical College(ITC))

“Brief Introduction of ice engineering R&D work regarding Floating structure in Korea touched by Inha Technical College”

(4) Jihoon Jeong (Korea Polar Research Institute(KOPRI))

“Korea's Scientific Activities in the Arctic”

14:30-14:45 Tea break

14:45-15:30 **Session 4 : Sustainable Use of the Arctic**

Chair: Natsuhiko Otsuka (CPC, ARC)

(1) Eiji Sakai (the Ocean Policy Research Institute of Sasakawa Peace Foundation, OPRI),

”Emission from Arctic Shipping Activities”

(2) Koh Izumiyama (former group head at NMRI)

”Oil Spill Problems in Ice Covered Waters”

(3) Natsuhiko Otsuka (CPC, ARC)

”Sustainable Use of the Northern Sea Route, Research by ArCS”

15:30-15:45 Tea break

15:45-16:15 **Wrap-up Session**

Chair : KIM,Jong-Deog(Justin) (KMI)

(1) Wrap-up comments on the sessions

(2) Discussion on “Suggestions for the Future NPARC”

16:15-16:20 **Closing Remarks**

by Ryuichi Kuwajima (OCDI)

2, List of Participants

No.	Name	Job title	Affiliation
China			
1	Yang Jian	Dr., Vice President	Shanghai Institutes for International Studies(SIIS)
2	Zhang Yao	Dr., Director of The Center for Maritime and Polar Studies at SIIS	Shanghai Institutes for International Studies(SIIS)
3	Cheng Baozhi	Dr., Senior Fellow of The Center for Maritime and Polar Studies at SIIS	Shanghai Institutes for International Studies(SIIS)
4	Jingfung Tu	Dr., Assistant Professor	Polar Research Institute of China(PRIC)
5	Luo Wang	Dr., Research assistant	Polar Research Institute of China(PRIC)
6	Xu Hua	Dr., Assistant Researcher	China Waterborne Transport Research Institute(WTI)
Korea			
7	Sung Gwi Kim	Dr., President	Korea Maritime Institute(KMI)
8	KIM, Jong-Deog (Justin)	Dr., Director General of Strategy Research Division	Korea Maritime Institute(KMI)
9	KIM, Ju-Hyeoun(Ms.)	Dr., Researcher	Korea Maritime Institute(KMI)
10	Kang, Kuk Jin	Dr., Advanced Ship Research Division Principal Research Scientist	Korea Research Institute of Ships and Ocean Engineering(KRISO)
11	Wooik Choi	Dr., HK Professor	Institute of Russian Studies(IRS), Hankuk University of Foreign Studies(HUFS)
12	Seungdo Ra	Dr., Research Professor	Institute of Russian Studies(IRS), Hankuk University of Foreign Studies(HUFS)
13	Hyun Soo Kim	Dr., Professor, Dept. of Ship & Ocean System	Inha Technical College(ITC)
14	SungJin Kim	Dr., Invited Professor	Seoul National University(SNU)
15	Jihoon Jeong	Dr., Junior Administrative Associate	Korea Polar Research Institute(KOPRI)
16	Hyunmi Lee	Dr., Junior Researcher	Korea Arctic Research Consortium(KoARC) Korea Polar Research Institute(KOPRI)
Japan			

17	Hiroshi Saeki	Dr., Chair person	Cold Region Port and Harbor Engineering Research Center(CPC)
18	Noriaki Kawai	Director General	Cold Region Port and Harbor Engineering Research Center(CPC)
19	Natsuhiko Otsuka	Dr., Professor	Hokkaido University Arctic Research Center(ARC)
20	Yasushi Fukamachi	Dr., Deputy Director, Associate Professor	Hokkaido University Arctic Research Center(ARC)/Institute of Low Temperature
21	Masato Tanaka	Dr., Professor	Hokkaido University Arctic Research Center(ARC)
22	Shingo Tanaka	Dr., Professor/Research administrator	Hokkaido University Arctic Research Center(ARC)
23	Ryuichi Kuwajima	Chief Researcher, Director of 3rd Research Division	The Overseas Coastal area Development Institute of Japan (OCDI)
24	Yoshihiro Takada	Senior Researcher	Hokkaido International Exchange and Cooperation Center(HIECC)
25	Eiji Sakai	Deputy Director, Ocean Policy Planning and Management Department	Ocean Policy Research Institute of Sasakawa Peace Foundation
26	Ryuichi Shibasaki	Dr., Head of International Coordination Division	National Institute for Land and Infrastructure Management (NILIM) Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan
27	Kanpei Iwasaki	Senior Researcher	Port and Harbor Department, National Institute for Land and Infrastructure Management(NILIM)
28	Yuji Kodama	Executive Director	Office of Japan Consortium for Arctic Environment Research Arctic Environment Research Center National Institute of Polar Research
29	Yusuke Kawaguchi	Researcher	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
30	Shin-ichiro Tabata	Dr., Director, Professor	Slavic-Eurasian Research Center, Hokkaido University
31	Koh Izumiyama	Dr., Former Group Head at National Maritime Research Institute	National Maritime Research Institute
32	Yuzo Mizuno	Dr., Emeritus Professor at Hokkaido University of Science	Cold Region Port and Harbor Engineering Research Center(CPC)
Observers			
33	Shigeshi Kitahara	Dr., Manager	Cold Region Port and Harbor Engineering Research Center(CPC)

34	Yuichi Nakajima	Senior Researcher, Port & Coast Research Team	Civil Engineering Research Institute for Cold Region
35	Lassi Heininen	Dr., Professor	University of Lapland
36	Mihoko Kato	Dr., Specially Appointed Assistant Professor	Slavic-Eurasian Research Center, Hokkaido University
37	Tomoko Tabata	Dr., Associate Researcher	Slavic-Eurasian Research Center, Hokkaido University
38	Daria Gritsenko	Dr.,	Aleksanteri Institute, University of Helsinki
39	Tetsuya Hayakawa	Dr., Senior Officer	Hokkaido Regional Development Bureau (HDB,MLIT)
40	Kuniaki Suzuki		Hokkaido Government
41	Noriyuki Shirato		Hokkaido Government
42	Toru Tamura	Dr., Professor	Framework of Citizens, Hokkaido University
43	Kazuo Tokikawa	Dr.,	Framework of Citizens,
44	Syousuke Toki	Dr., Emeritus Professor at Hokkaido University	Framework of Citizens,
45	Kazunori Mihara		Framework of Citizens, FUJI Construction Ltd.
46	Katsumi Ichikawa	PE.	Framework of Citizens, North Japan Port Consultants Ltd.
47	Hiroki Ishikawa	PE.	Framework of Citizens, North Japan Port Consultants Ltd.
48	Shinsuke Tomatsu	PE.	Framework of Citizens, North Japan Port Consultants Ltd.
49	Hema Nadarajah	PhD Student	University of British Columbia
50	Pavel Baev	Dr., Research Director, Research Professor	The Peace Research Institute Oslo
51	Xun Zhang	Dr. Candidate, Research Fellow	Hokkaido University Arctic Research Center(ARC)
52	Yoo DongHo	Consul	Korea Consulate in Sapporo

3, Opening Address

Hiroshi Saeki (Chairperson of the CPC)

Distinguished participants from honorable research institute of China and South Korea, and also from Japan, ladies and gentlemen, good morning. I am Hiroshi SAEKI, Chairperson of the *Cold Region Port and Harbor Engineering Research Center, CPC*. It is our great honor to host the 3rd “*North Pacific Arctic Research Community Meeting*” in Sapporo. I would like to start my opening address by expressing my sincere gratitude to “*Korea Maritime Institute*” KMI for its great help in organizing this meeting. And it is our great honor to have many distinguished researchers from China and Korea as well.

Our institute, the *CPC* was established in 1987 as an incorporated association in Sapporo Japan. The objectives of *CPC* are to develop ports and regional communities which are characterized by cold climate, snow, ice, and icy sea. Our research activities include maritime transport, planning and structural designing of port, disaster prevention in port, and regional development as well. Our research results indicate that the Arctic is warming twice as fast as average rate of the rest of world. And the Arctic sea ice is continuously decreasing especially in summer.

Given the importance of securing sea routes in emergencies and as an Alternative sea route, and also when seen from a commercial point of view such as procuring Arctic natural resources, and establishing a shortened sea route between the east and the West, the Northern Sea Route attracts world attention today.

As you may know, Hokkaido where we live is the northernmost island of Japan facing two international straits that connect East Asia and the North Pacific. And most of the Northern Sea Route transit voyages have been used these two straits. Thus, Hokkaido region is giving a great attention to this new shipping route in terms of being one of the base port for Arctic shipping in Asia.

However, the world has only several years of experience in commercial use of the Northern Sea Route. Regarding sustainable use of the Northern Sea Route, we are facing many issues such as navigability and safety, effective business model, maritime transport market condition, environmental protection, social impact and so on.

I believe that the *North Pacific Arctic Research Community* will advance the research on these emerging issues and strengthen our mutual cooperation and friendship. Also I believe that we will have fruitful sessions by exchanging many ideas and thoughts between distinguished participants.

Lastly, I would like to conclude my speech by thanking Hokkaido University Arctic Research Center(ARC), The Overseas Coastal area Development Institute of Japan (OCDI), Hokkaido International Exchange and Cooperation Center (HIECC) and KMI again, for their strong initiative and support. Also let me give thanks to all of you. Thank you very much.

Sung Gwi Kim (President of KMI)

Good morning, everybody. I'm very glad to have this NPAC meeting like this beautiful area via Hokkaido University Centennial Memory Hall. In this building, as you know, when you can see the all, maybe, presidents of this university. So it is university president is just now looking down over us. I think that we can't speak careless things in today's meeting.

I'd like to extend my warmest welcome to all who came to participate in this 3rd seminar of North Pacific Arctic Research Community, we call it NPARC, at the inauguration in Jeju, Korea, in 2014, and it's second seminar in Shanghai, China in 2015. First of all, I'd like to express my sincere gratitude to the local organizer, Cold Region Port and Harbor Engineering Research Center, Arctic Research Center of Hokkaido University, Overseas Coastal Area Development Institute of Japan, and Hokkaido International Exchange and Cooperation Center to have our seminar in this beautiful city Sapporo. There is a leading institute in arctic initiative of Japan is located. My special thanks goes to Hiroshi Saeki, the former president of this university, and also Dr. Natsuhiko Otsuka for their wonderful contribution to our seminar.

In particular, this is our honor to have professor Sung Jin Kim of Seoul National University, who was the former minister of maritime affairs and fishery, and Mr. Yang Jian, the vice president of Shanghai Institute for International Studies. In addition, I'd like to welcome our new partners, many from Japan, including Slavic Russian Research Center of Hokkaido University, Office of Japan Consortium for Arctic Environmental

Research, National Institute of Polar Research, and Civil Engineering Research Institute for Cold Region, and Ocean Policy Research Institution of Sasakawa Foundation.

I believe it is very crucial to make a long lasting collaboration among academic obligations on newly arriving and sensitive Arctic issues for the sustainable development in our region. Thus I hope the NPARC, NPARC is a voluntary research community composed of research institutes and university in the North Pacific, could provide information for working together to better understand until resolving global agendas of the Arctic.

KMI as a secretariat of this initiative, provides already representatives of NPARC partners to show experiences and research information and discuss about future and support strongly. Asian countries, especially Korea, China, Japan, share common interests and faced with challenges in the Arctic issues.

Although we are not Arctic states, in Arctic states, many Arctic issues may still have direct and indirect effects to our region. In this respect I strongly believe that sole NPARC seminar will strengthen our cooperational researches on emerging challenges and opportunities in the Arctic and will build a concrete foundation for a long-term cooperation on earth.

Ladies and gentlemen, on 28th April this year, officials in 3 countries have very meaningful meeting named the 1st bilateral high level dialogue on the Arctic among 3 countries. I think which will be a new step for development cooperation on the Arctic in the future. I think based on this step there will be an additional measure and discussions on 3 countries to

deal with a diverse agenda such as scientific and business cooperation for sustainable development of the Arctic. So I suggest that we can have discussion during our seminar today how the NPARC can involve in this national level dialogues on the Arctic challenges.

Last but not least I'd like to thank all the participants for your constant support and contributions to these endeavors. And I also thank again CPC, ARC, OCDI, HIECC for this beautiful arrangement. I expect this seminar will generate fruitful outcome. Thank you. Thank you very much.

4, Keynote Speeches

Keynote-1 KIM, Jong-Deog(Justin) (KMI) “Recent Korea’s Arctic Initiatives”

Good morning. I’m Justin Kim from Korean Maritime Institute. It is my great honor to be here and have presentation regarding recent Korea’s Arctic Initiatives to all of the participants of NPARC. As I look back in 2013, right after of the observer ship of the Arctic Council when China, Korea, Japan became observers in the Arctic Council, I actually sent some e-mails to some actors in this room to have this trilateral informal expert level discussion in our region. I got 4, 5 very positive responses from Japan and China. So I circulated this idea to all of the arctic related universities and institutions in our region.

In 2014, I invited China researchers and Korea Arctic expert. That time we had 13 participants; 1 from Japan, 7 from China, and 5 from Korea. We agreed to have these seminars regular base in the future.

And finally China invited us the 2nd seminar in Shanghai last year. The number of the participant was 18 organizations. Today I heard that official partners of this meeting is 20, including observers of this meeting the number goes 30. So I’m very happy, very proud of this expansion and deeper understandings of the cooperation on the very sensitive Arctic issues in our region. Thank you for all. I will start my presentation.

This is not actually a keynote speech. I want to introduce Korea’s activities mainly political and social issues. Maybe my colleagues from KOPRI, he will explain with scientific activities of Korea in the later

session.

This is my institute located in Busan, Korea. It's in southeast end of the Korean Peninsula. My president, Mr. Kim, leads our institute. We have almost 270 researchers and also we have 70 laboratories to research for development, shipping, fisheries, and also marine environment, strategies research item including Arctic.

Today I'd like to introduce about Arctic activities of Korea's very shortly and during the break or the other times I can explain more if you want to know about this one.

Regarding Arctic Council activities, since 2013 we participated almost 14 or 13 working group, task force meetings of Arctic Council supported by the government. This is the summaries of the activities. After that I circulated some questionnaire survey to participants of the working group or task force mainly expert level, university professors and also researchers. This is summaries of their responses. For example, I just introduce one-one question survey vision. All of them are participating in Arctic Council using our capacities. So they have very practice to join Arctic Council activities. This presentation I will circulate it later so you don't need to write down this complicated presentation.

To join this working group and task force, our government organized expert group levels networks in Korea. Now we have 47 experts, Korean experts, to join the Arctic Council activities. About 10 persons, they have experience to join the working group and task forces. This year we are going to upgrade this participant list based on the new initiatives of the Arctic Council.

After that we have the workshop to share their understanding, their information which got from the Arctic Council meeting. Every 3 months we got together and we share that information to the other Korea Arctic expert level members. This is kind of the public people and also expert in Korea on Arctic issues. Through that kind of participation, we develop one joint project with the indigenous peoples of the Arctic Council. AIA is standing for Aleut International Association. This is one common participant of Arctic Council. We agreed to join their project as partners. That project is Arctic indigenous marine use mapping project of the Arctic Council. In this working group, AIA suggested this project to the Arctic Council. So we in particular Korean Maritime Institute is a member of, a partner of this project. We share some part of the project by providing some project, also our expertise on this level.

I don't want to explain about NPAC in our meeting now but this is more overall approaches of the Korean Maritime Institute. North Pacific Arctic Conference, we are hosting this conference from 2011 in Hawaii. East-west Center of the United States and Korean Maritime institute co-host this conference since 2011.

The conference concept is why don't you share geopolitical understandings of Arctic issues and opinions in our region including Arctic states, United States, Canada and Russia, and plus China, Japan, Korea, sharing the most Pacific together. We have conference organizing committee. Yang Jian of the SIIS, he is our committee member. As you can see United States, Canada, and Russia, China, Korea consist of this conference organizing committees. This year we will have this conference

in Hawaii as well from 10th of August to 12th August in Imin Center of the University Hawaii. This is brief contents of our conference.

Last year, I recognized that information sharing is very fundamental and very important to understand the Arctic properly. Many information, they provide different views of the Arctic situations. We recognize the information sharing, proper information sharing is very, very important. So I invited several information providers in local region as well as North American region. We had very fruitful discussion how to overcome the barriers of information on the Arctic issues. We will have the second seminars in coming December.

This year the government and also research institute agreed to have the more comprehensive drastic initiatives on the Arctic, to understand the Arctic. We name that is 2016 Arctic Partnership Week. In December whole week we provide information and time to present their ideas and their opinions on the arctic issues. This is very draft, very tentative program of the Arctic Conference week. The basic concept is designate some days as some special issues. For example, 6th of December, we will allocate policy issues for that day. Second day we will discuss more scientific issues, business issues, and also cultural and Arctic issues in different days. So all the participants can enjoy Korea's policies, science, business and also cultures together during the whole week. That is our basic concept. We are developing this Arctic partnership week concept and we will deliver the final schedule, or the concept, ideas, by the end of July for the other information system.

As I mentioned before, information system is our one of the major

targets. In Korea the ministry of port and fisheries, they designate Korean Maritime Institute as a developer on the Korea Polar Portal Service for the publicater of Korea's. This year in March we start to service various information in Korean version only, so maybe next year you can expand in English or the other languages.

For the future cooperation, we suggested to have some exchange program between the Arctic and Korea. Last year we established Korea Arctic Academy. This is very short academic cooperation for the Arctic. We invited 11 Arctic students through the cooperation with universities in Arctic. We added 19 Korean students together in our own class. We invited some lecturers and speakers from Korea and other regions. They provided their knowledges and their visions on the Arctic together to Korean students and also Arctic students. This year from next week we'll have the second Korean Arctic Academy's. Now we decided 20 international students with involvement Korean students together. It is the continuing academic initiative for the future generations.

To Korean students, we selected some numbers of Korean students to enjoy the academic experience in the polar regions. Last May, we selected 3 Korean students and we send them to the University of Tromso in Norway to learn their Arctic oriented class in the universities. Because in Korea at this moment we don't have specialized lectures or classes for the Arctic so this is very initial step to understand how to Arctic Academy's activities is moving in university level in European region. Also in coming second half of this year we will send some of them to University of Canterbury in New Zealand to understand South Antarctic issues in the

world, in global societies.

Others, we have one delegation from Korea Arctic Research Consortium today. Last year in November we established Korea Arctic Research Consortium participating from 27 entities of Korea's including government, research institutes, universities, and also private sectors together. We have 3 sub sessions; scientific session, industrial session, and also policy session. We are designating one leading coordinating organization which participated in sub session, and we are developing some project for the future how to converse or collaborating interdisciplinary approaches on the Arctic. So maybe there must be some international cooperation project and so on. So we will invite you to join our activities in the future.

Also in 2013 Korea developed Arctic Master plan, national levels Arctic Master plan. And according to the master plan we set up annual implementing program earlier of the year. This year also we established implementing plan based on the Arctic Master plan of the national level. So we step by step moderate or change some part of our original program to address the new changes of environment of the Arctic.

My opinions as I mentioned trilateral dialogue on the Arctic among 3 countries in April. It was also a wonderful time to share, to recognize directions almost same among 3 countries. There's a lot of experience to collaborate or cooperate in the future. Japan invited second trilateral seminar in Japan. Delegations of Japan, Ms. Shiraishi, she suggested to have the second trilateral meetings in Japan next year.

So you know that process of the negotiations for agreements to

prevent unregulated high seas fisheries led by the United States and Canada and other 3 Arctic coastal states. Maybe next week there is a lot of negotiations in Canada as well. We and Korean government are very eager to join negotiation with Arctic coastal states.

Last week, 1st of July, Ministry of foreign affairs, they hosted international seminar for celebration of the 20th anniversary of the Arctic Council. 1996, 19th of September is the day of the Arctic Council establishment. We invited one SAO, senior Arctic official of Iceland who joined us and also the vice president of the Arctic Economic Council, Mr. Tero from Finland, he joined our seminar. So we shared a lot of progress of the Arctic Council and future of the Arctic Council together.

And also how this law in the future, a lot of observers in the future, their expectations and also our expectation, we try to share the different views on the Arctic.

This is all I prepared today. Once again I'm very proud of this meeting and am very happy to answer any questions for me. Also I have lots of questions to all of you. Thank you very much

Keynote-2 Yasushi Fukamachi (ARC)

“Arctic Research Center of Hokkaido University and Japanese Arctic Research”

Today our director Saitoh is away for a meeting in Tokyo, so I am going to give a presentation on his behalf.

This is outline of my talk. First I'd like to introduce Arctic Research Center of our university. Next I'd like to introduce Japanese Arctic Research activities.

Arctic Research Center of Hokkaido University was established April last year. And as of today, July 1st, we have 7 full-time faculty members and 30 additional faculty members, including Otsuka-san newly joined us. We have 6 research groups in our center. One is Atmosphere and Hydrosphere Research, Terrestrial Research, Cryosphere Research, Practical Research which is basically engineering in applied science, and Social Science and Humanities Research, and Satellite Observation and Modelling Research Group. We emphasize interdisciplinary research in our center. We have a plan to hire more full-time faculty members later this fiscal year.

Next I'd like to talk about vision and missions of our center. Vision is contributed sustainable use and conservation of the Arctic region. Mission is that establish new Arctic science through trans-disciplinary even farther than interdisciplinary approach, promote capacity building--which is educational aspect--and innovative research for problem solution of the Arctic issues, third is promote activities of Industry-Government - Academia cooperation and collaboration. These missions are, and vision of

our center is one of the important points of our university's 150-year anniversary in 2026. One of strategies is activities at our center.

This is website of our center. If you have interest, you can visit our site and we are trying to up lot of information about Arctic issues in Japan at this website.

In addition to our Arctic Research Center established last year, we also have different scheme in our school to promote international cooperation for Arctic researches. We established so-called Global Station for Arctic Research April this year. This is basically promoting international collaboration with universities and research institutions overseas.

We have 3 units for this system. One is North America Marine Environment Unit, which aim is understanding variability of sea ice, ocean and ecosystem, and their impact on society. Our collaboration partner is University of Alaska in U.S. And I'm PI of the unit. Second one is Russia/Northern Europe Terrestrial Environment Unit. Its aim is understanding vulnerability of environment and society, and their resilience. Our partner is North-Eastern Federal University in Yakutsk, Russia, also University of Oslo in Norway. This is basically educational program for University of Oslo. PI of this group is Professor Sugimoto of our center. The last one is Northern Sea Route Unit. Its aim is creation of new maritime industries and development of new world markets. Our partner is University of Leeds in United Kingdom. This unit is headed by Professor Otsuka.

In relation to the global station, we have 2 Belmont Forum projects

headed by our staff at the Arctic Research Center. One of them is so-called RACArctic, Resilience and Adaptive Capacity of ARCTIC marine systems under a changing climate. And this project is headed by our director, Saitoh. This is a Japan, Norway, U.S. collaboration project.

Another Belmont Forum funding project is so-called COPERA. This is a carbon budget of Ecosystems, Cities and Villages on Permafrost in the eastern Russian Arctic. PI of this project is Professor Sugimoto of our center. This is Japan, Russia, and U.S. collaboration project. Using these projects and also using global stations, we are trying to promote international collaboration.

Next I'd like to briefly introduce Japanese International Scientific Activities for the Arctic Region. In the past we have contributed to AC communities by sending experts to various working groups and me. Last year we hosted ASSW in Toyama, Japan.

This is a brief list of Japanese former, previous scientific activities through international collaboration. Some of them are like ecological studies in Ny-Alesund for last 20 years, and also observation in Arctic Ocean by JAMSTEC research vessel Mirai for last 30 years, and also observational studies in eastern Siberia, Yakutsk region for last 20 years.

However, these research activities were individual efforts by different institutions. So in 2011, Japan started coordinated research project called GRENE Arctic Climate Change Research Project, which ended last year. This is the first coordinated nationwide effort to promote research activities. In this project, we have reviewed the mechanism of polar amplification. We have done seasonal projection of summer sea ice

condition, build mechanism sea ice decline causing severe winter in mid latitudes. Based on these past achievements and advantage, ArCS, which is new project I will talk about later, will respond to expectations from the Arctic countries as an “AC observer”, showing Japan’s presence in Arctic research.

Next I’d like to introduce Japan’s Arctic Policy, which was announced October last year. Basically Japan seeks to contribute to the international society as a main player to address Arctic issues. Basic perspective is fully utilizing science and technology--this is a key--from global view point. There are 7 basic perspectives. But like this second one, fully considering vulnerability and low resilience of the environment and eco-system in the Arctic, and also 7th, pursuing economic possibilities like the Arctic Sea Route and research development, these are very closely related to the topic of this meeting. As specific measures, we emphasize research and development, international cooperation and sustainable use. Once again, science and technology are highlighted as key areas in Japan’s contribution.

Next I’d like to talk about new Japanese Arctic research project called ArCS, which is Arctic Challenge for Sustainability, which started last year and last till fiscal year 2019. New aspect of this project, different from previous one, is that to deliver the robust scientific information to stakeholders. This contribution to stakeholders is something new for this project. Stress points are; proactive international cooperation, this is also highly emphasized, stakeholder linkage, and trans-disciplinal team including social science which was part of previous project called GRENE.

These are our new stress points for this new Japanese Arctic project. And Professor Otsuka will explain complementarily later during this meeting.

There are 3 main ArCS project activities. One is expansion of research base and stations. We have a few sites of Arctic base and stations in like Fairbanks, and also Ny-Alesund. We'd like to expand these bases and stations through this program. Also we have a program sending experts and young scientists to overseas Arctic research institutes. The last one, the biggest part of this project, is of course international research collaborations. Through those activities we try to provide the opportunity to research co-designing with the domestic and international stakeholders, good ideas of social and cultural studies for future bridging industries and the Arctic.

Finally, I'd like to very briefly introduce another infrastructure started April this year so-called Japan Arctic Research Network Center, J-ARC Net in short. This is like a national network of 3 institutions; Hokkaido University Arctic Research Center, and counterpart is National Institute of Polar Research, also another counterpart is JAMSTEC. These are combined to have one collaborative project. ArCS project is the infrastructure for that project last for 6 years. We will of course collaborate with domestic universities and research institutes and international partners in other countries, too. Some of the highlights of this activity is industry, government and academia cooperation. And we are planning to have joint Japan-Russia center in Russia also.

Thank you very much for your attention.

Keynote-3 YANG Jian

(Shanghai Institutes for International Studies (SIIS))

“The Asian Countries and the Arctic Future”

Distinguished Minister Hiroshi Saeki-san , Chairman of the CPC, and distinguished Minister Kim Sung-Gwi, President of the KMI and the Director Kawaii, the participants on Japan, Korea and China, ladies and gentlemen: Minna-san, konnichiwa.

My colleague and I were very delighted to be invited to participate this important seminar. In the past few decades, the aggravating climate change and the Arctic have experienced a political environment deterioration and a rise in economic opportunities. As a result of climate warming and increase of the human activity in the Arctic, the environment of the ecologic face great challenge. The countries already resorted to exploitation and exploration of the natural and social, other resources and the protection of natural and social ecology are increase extremely. So there is a change to get political gain regarding to the responsibility-sharing and obligation-sharing of Arctic governments and the distribution of the interest of the Arctic resources. How to establish an effective institution to balance our regional development and environmental protection is now a pressing issue. Furthermore, in the era of globalization, how to include external factor is also an important subject in the Arctic governance. So that is utilization of the future and Asian countries.

So what's the matter with the East Asia countries to the Arctic governance? With our great achievements, East Asia country has got a reputation as the main engine of world economy. Since 1960s, Japan has

borne from the ruins of war like a phoenix to become the leader of the East Asia's economic development. And in the following decade, the small Asian dragon--Korea, Singapore, Chinese Taiwan and Hong Kong, so on—soon followed suit. That illuminating the China's path to become the flying dragon, in terms of the economic development, of decades of economic reform, the economic development of China, making the continents and important column of world economy. Now the recent years, the rapid development of Malaysia, Thailand, Philippines, Vietnam and Indonesia in 1990s and so countries for the ASEAN region.

The Asian country enjoy traditional Oriental civilization. After World War 2, especially the Cold War, of the Cold War, Asian country have seen the rapid development and made their own contributions to world economy. Some primary driving forces of their rapid economic development include their fear or inferiority, and the favoured for emulate the pattern of Western countries' modernization.

The development of the Asian country includes acquiring technology and production from developed country which they require some necessary steps towards modernization. Therefore, Western countries have moved large number of their production line to Asian coastal countries, which become a large factory. So in last two decades, China was also labelled the “world plant” or “world factory.”

The increasing demand for energy and resources. Prospect for exploitation and exploration of the Arctic resources endorsement makes this Asian country potential market for Arctic products such as oil, natural gas, minerals and marine products.

Because of Asian countries' large population, as well as the last decade's wealth accumulation, and the peoples' increased purchasing power, the Asian market has become where the hope lies for some Arctic country future development. Besides development in possession and production, many Asian countries have become important trade and shipping country as any major shipping event in the world would impact the economy of this country.

For example, the commercial opening of the Arctic Sea route might bring positive or negative impact to the major Asia seaport city. Investment and trade patterns related to shipping cost would change and economic incentives would increase. Asian countries are also user of the Arctic Sea route and with the planned change and enhancement of shipping condition, Asian country will enter the Arctic through the navigation of Arctic Sea route. This is an inevitable result of the globalization, giving this aspect the Asian country newcomer and the need to acquire knowledge and, again, some experience in this region.

The Arctic country help non-Arctic country development, the Asian culture stage deeply understand the mission and take the responsibility of Arctic governance and make due contributions. Besides hope to lead participation of non-Arctic country in sustainable development of the Arctic, Arctic countries also worry that their administration will make governance more difficult.

In the process of pursue the pattern of Western countries' modernization, Asian country are also experience adverse impact of the industrialization on the environment, ecology and health. They are quickly

abandon the obsession for industrialization and are building modern ecological civilization with traditional Asian knowledge. Over Asian coastal stage are also restoring the use of education and academia for the society. Following Japan, countries like Singapore, Korea, China and India, are making significant progress in technological and academic research. They have become the important force in Arctic research.

The accurate moral and academic foundation for the Asian country in the cooperation with Arctic country on the issue of Arctic governance. With the Asian country feels the core of the Arctic economic opportunity and the magnitude of mission of Arctic environmental governance. We also feel a sense of exclusion from some Arctic country towards some non-Arctic countries. This is due to Arctic countries' perception gaps of non-Arctic country in Arctic issue, as well as discrimination from some Arctic country in the arrangement of interests, responsibility and obligation. Asian countries should engage in comprehensive cooperation with Arctic country and contribute to a peaceful, environmentally friendly and ecologically balanced, sustainable Arctic. Japan, Korea, China are the very important economy in the world. Our joint efforts are meaningful to the world. The joint effort for the better Arctic governance—not increase our footprint in the Arctic but our positive role in the better future of the Arctic and the earth.

In 2015, in COP 21—that's C-O-P 21—the party to the UN eventually reached a historic agreement to combat climate change and to identify the joint action investment need for a sustainable low-carbon future. The leaders from Japan, Korea, China made their commitment

through the national determined contribution to spending our efforts in the year ahead.

I'm very glad in the platform like today's conference, like Eng. Park, the scholar from Asian country, from China, Japan and Korea, can discuss the area related Arctic governance and also the sustainable use of the Arctic and the weight of the future cooperation and reach a consensus to take on the challenge and responsibility of Arctic and global governance advice together. So from SIIS, we'll continue our efforts to join this platform, to make our own contribution with successful today's seminar.

Thank you very much.

5, Closing Remarks

Ryuichi Kuwajima (OCDI)

Distinguished participants, Ladies and gentlemen, It's a great pleasure for me to have this opportunity to deliver the closing remarks of the NPARC Sapporo Seminar.

Some interesting studies including the latest findings were presented in this seminar. I'm sure everyone was able to deepen their understanding on North Pacific Arctic Research through the presentations and discussions today.

As you know, the new Panama Canal finally opened last week. The capacity to accommodate container and bulk cargo vessels through the canal is now more than twice what it was before. And Liquefied Natural Gas, LNG carriers are now able to pass through the canal for the first time. This is truly an epoch-making development.

Current environment surrounding ocean transport freight is becoming intensely competitive due to the drop in chartered freight and oil cost. However, the Northern Sea Route is expected to be one of the major seaborne routes in the future due to fuel savings the lower risk of piracy. And once the NSR takes off, our countries, China, Korea and Japan can derive the most benefit from it. The knowledge accumulated at NPARC will surely contribute to the use of the Northern Sea Route.

Finally, on behalf of Japanese organizations supporting this seminar, CPC, ARC, HIECC and OCDI, I would like to express my appreciation to all concerned organizations and participants for kind support and cooperation in carrying out the NPARC 2016 Sapporo Seminar.

And now please allow me to declare the “Closing” of this seminar. I hope you will enjoy tomorrow’s site visit to Otaru and Yoichi and have a safe return to your respective destinations.

Thank you.

6, Slides of Presentation

(1) Xu Hua(China Waterborne Transport Research Institute WTI)

“Study on the competitiveness of icebreaker tariffs of the NSR”



Fig.-1

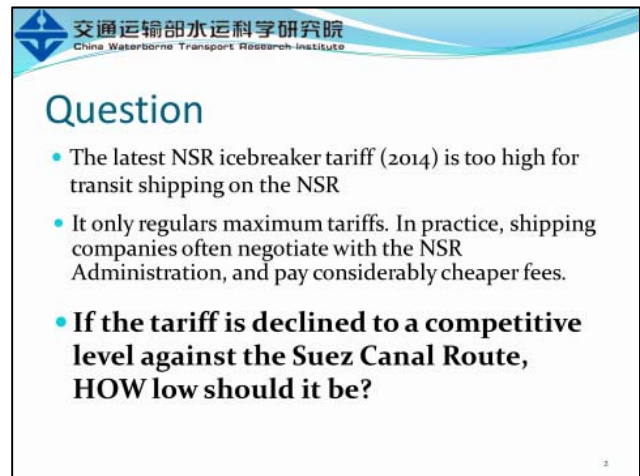


Fig.-2

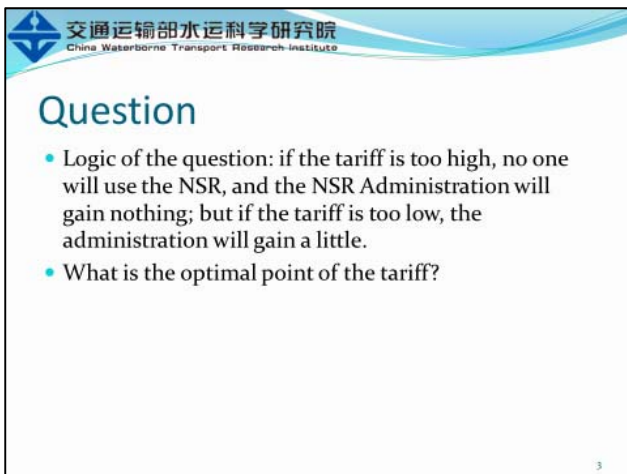


Fig.-3



Fig.-4

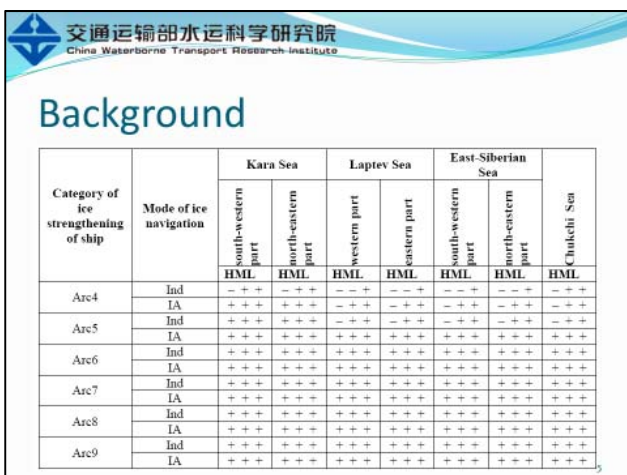


Fig.-5



Fig.-6

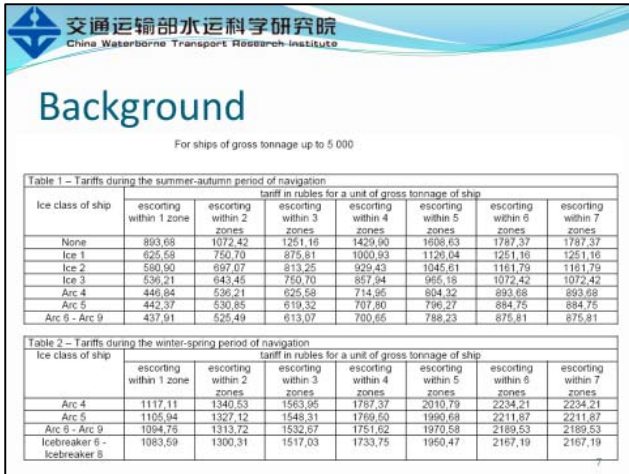


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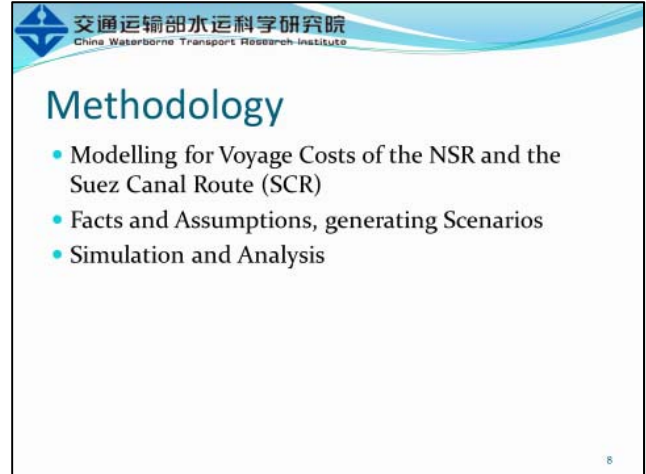


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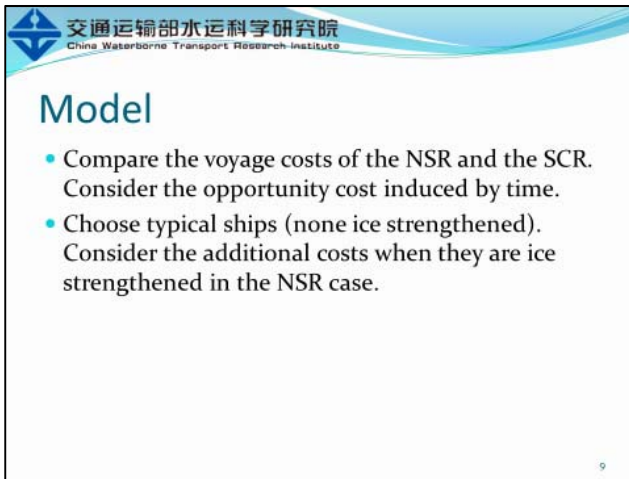


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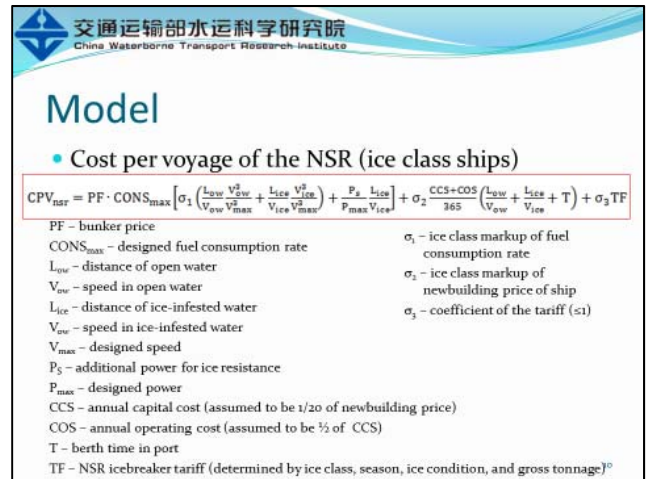


Fig.-10

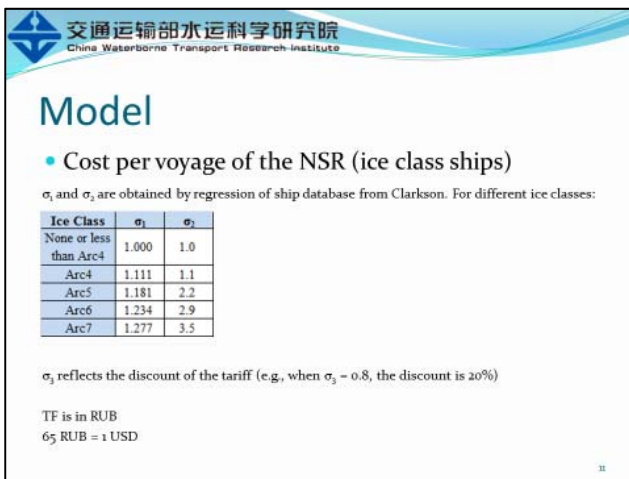


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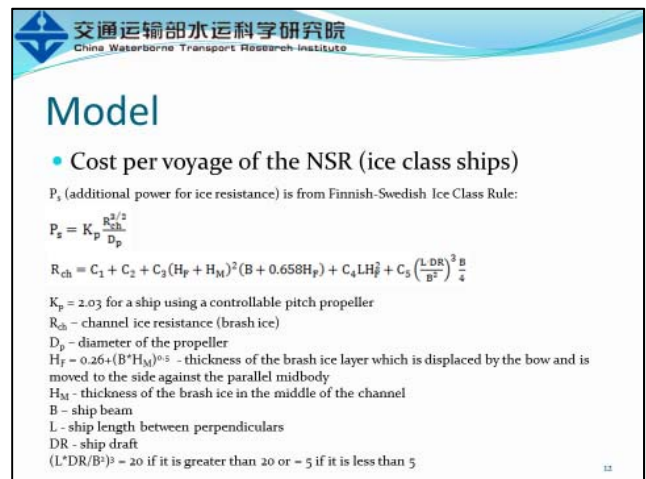


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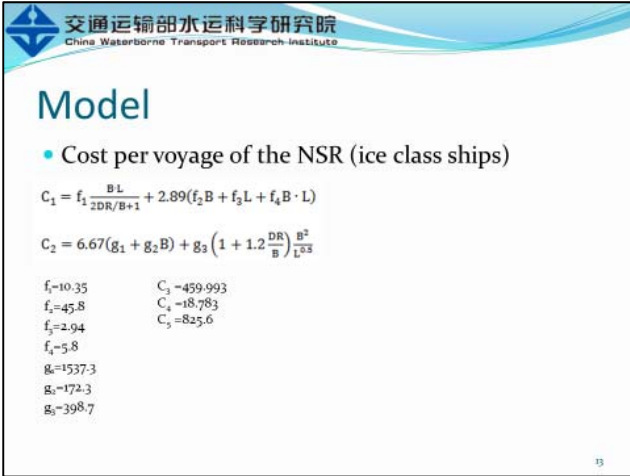


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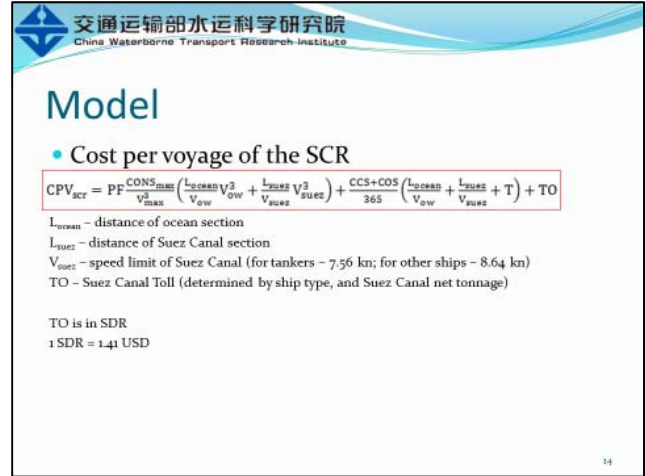


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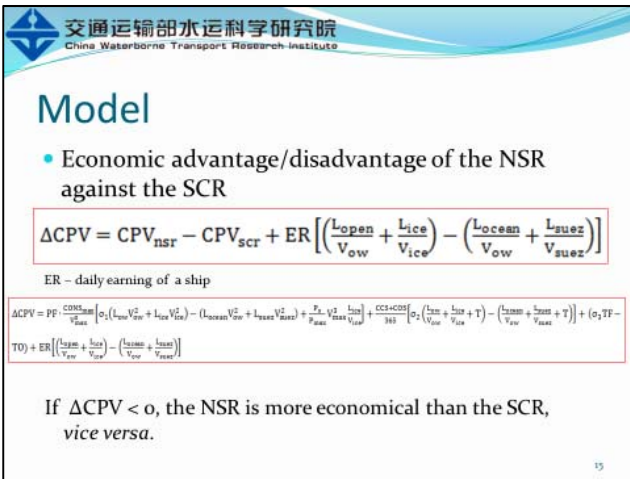


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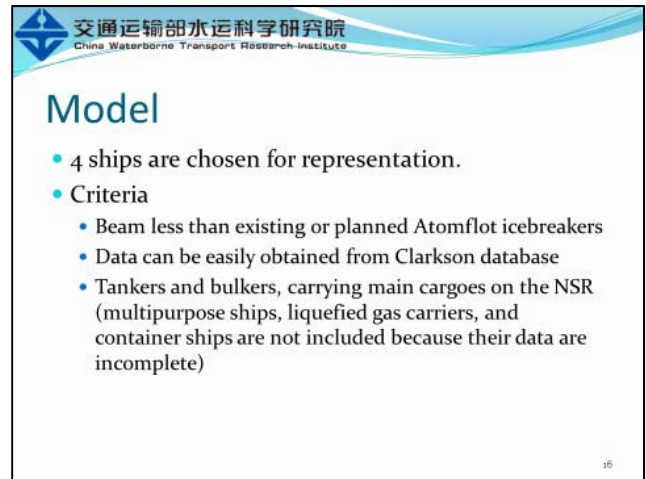


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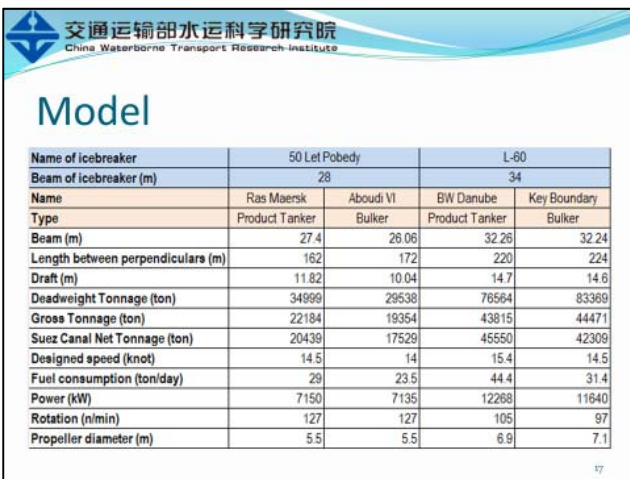


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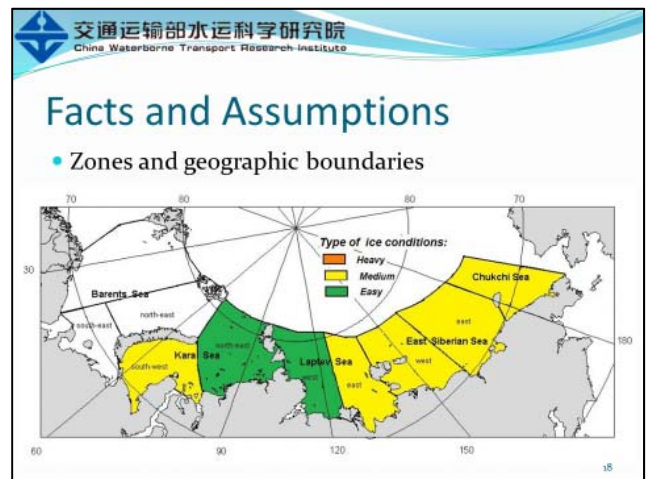


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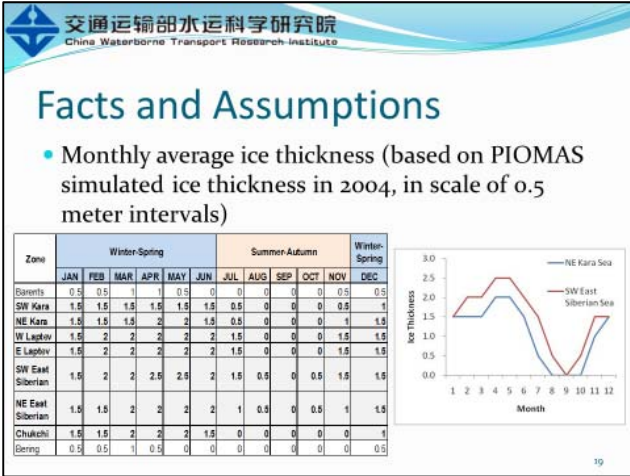


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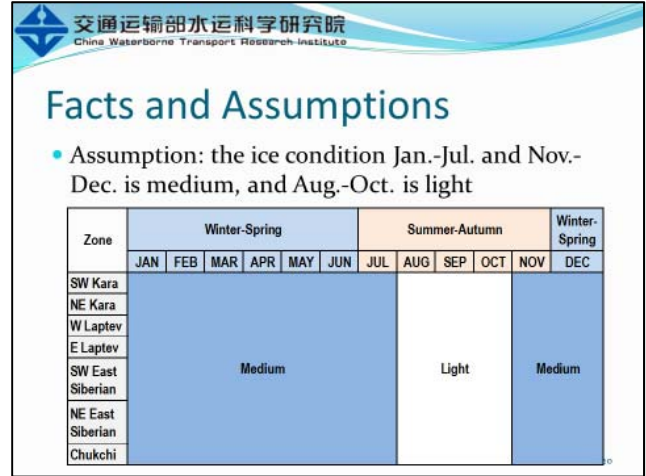


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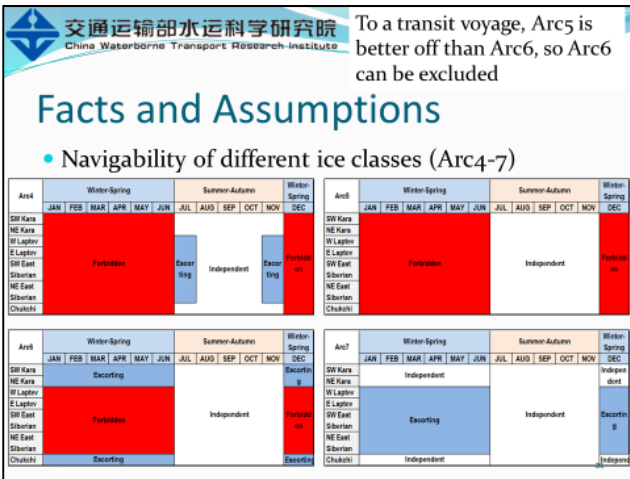


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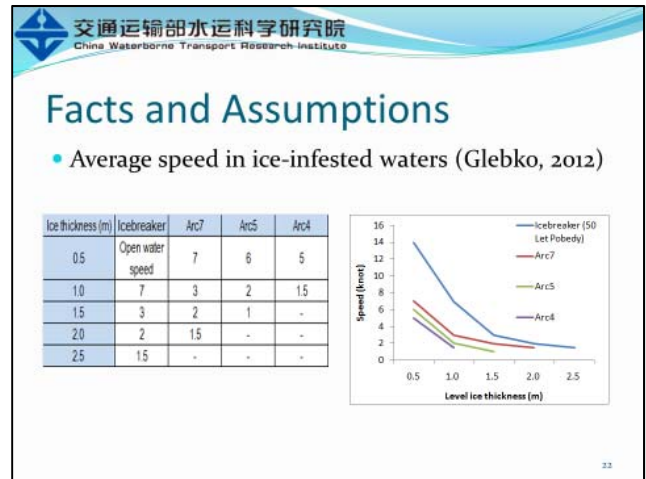


Fig.-22

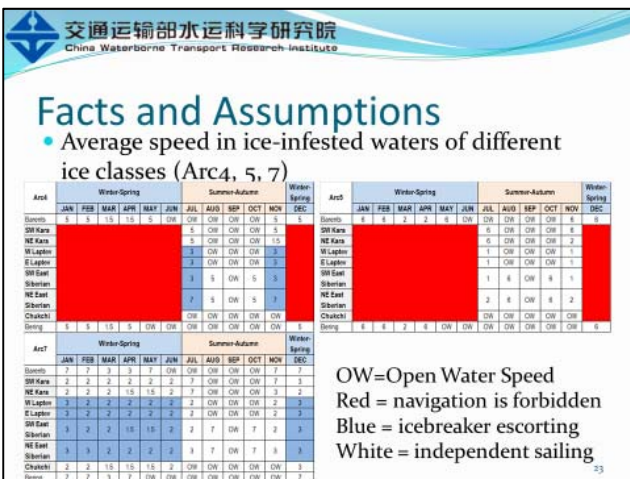


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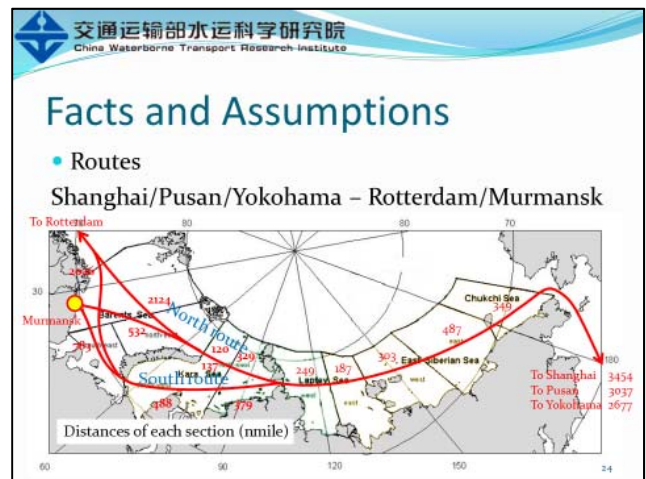


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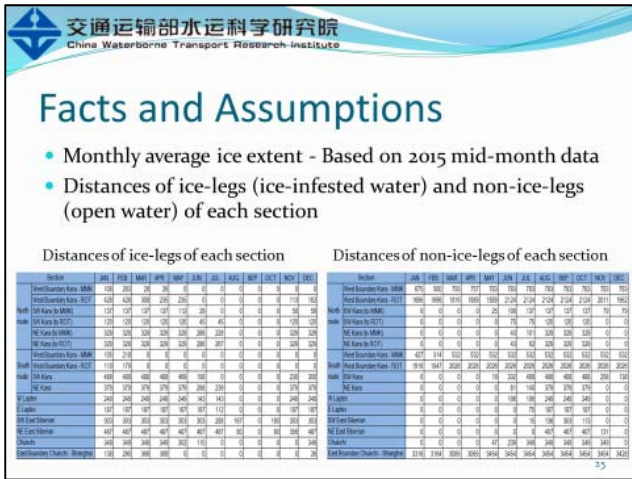


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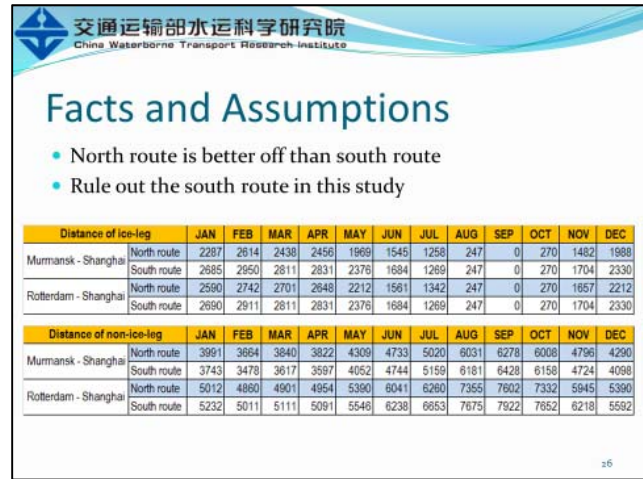


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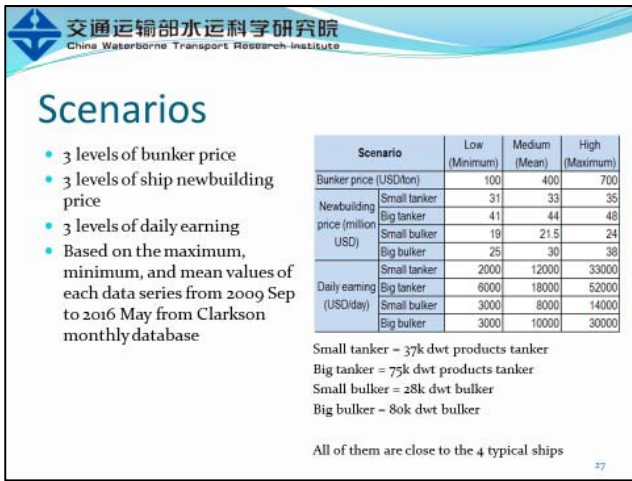


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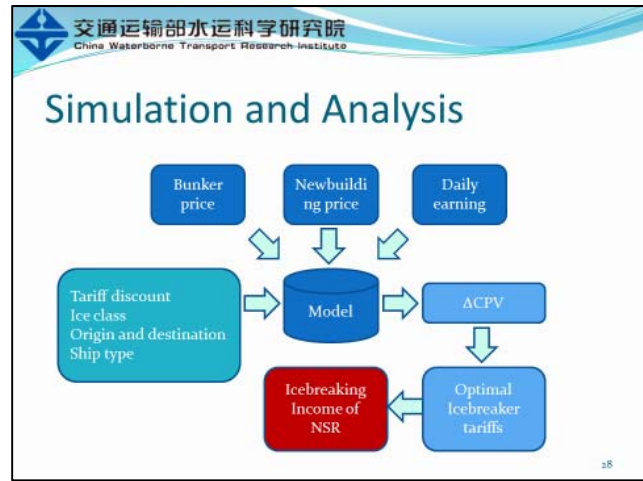


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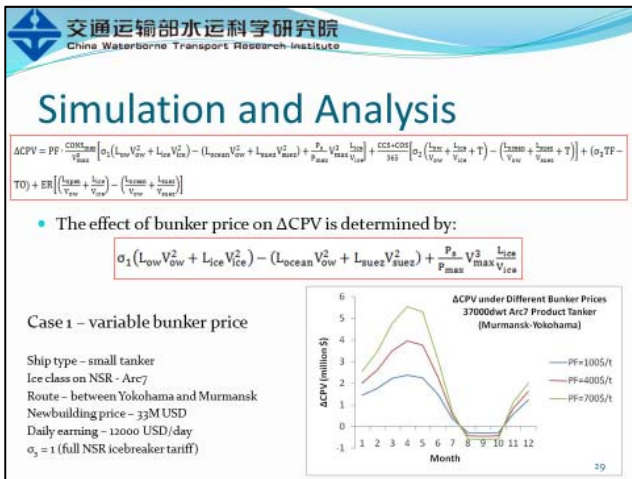


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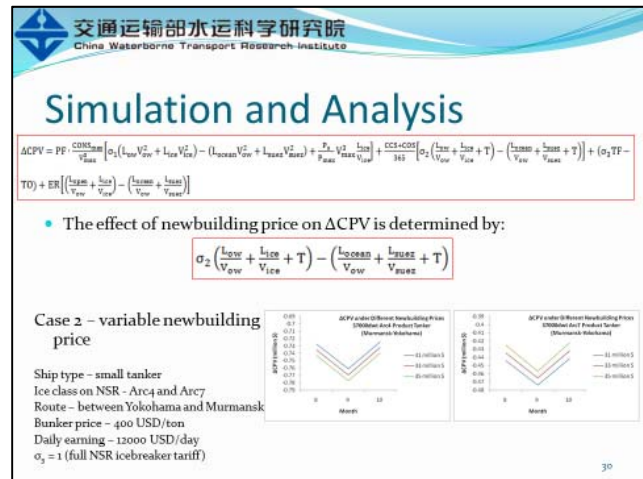


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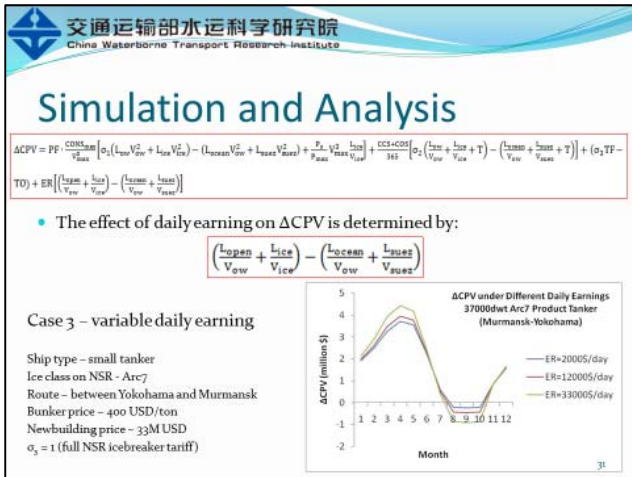


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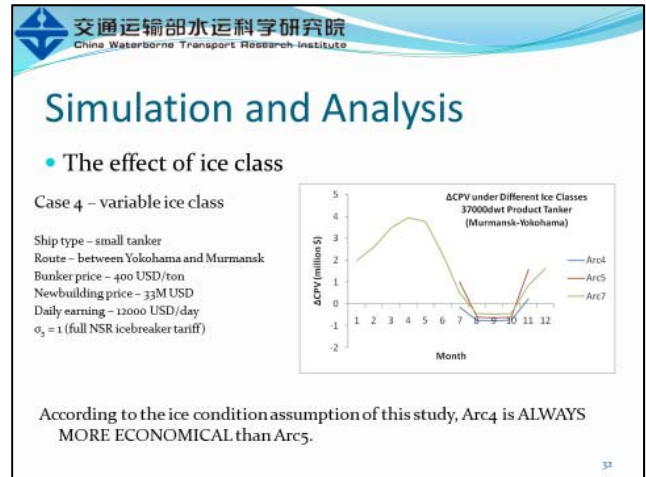


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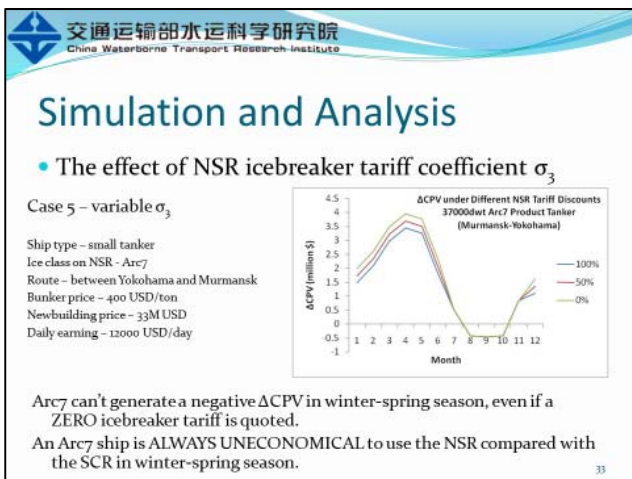


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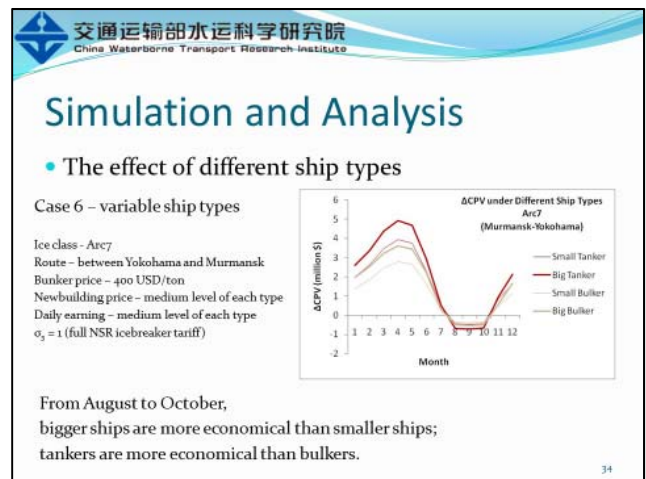


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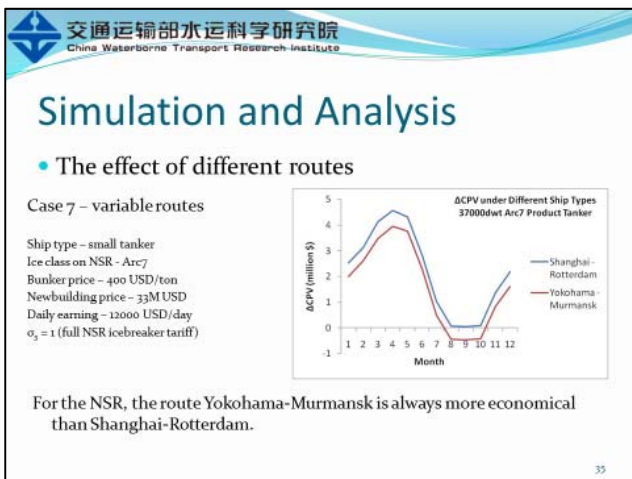


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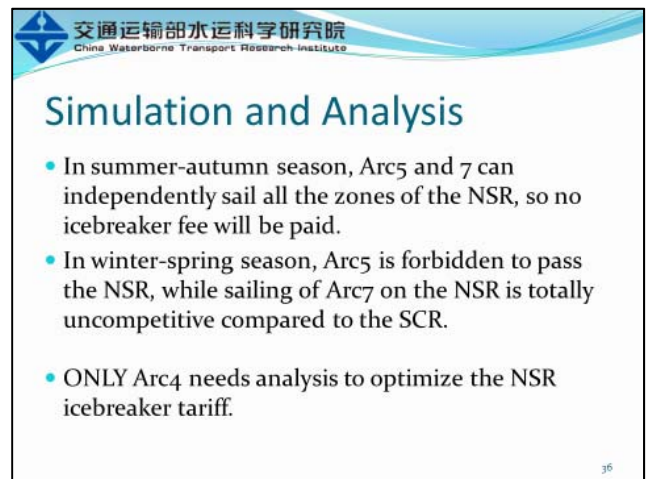


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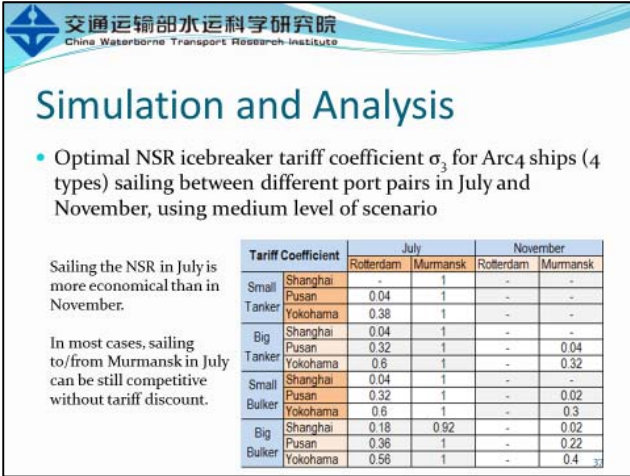


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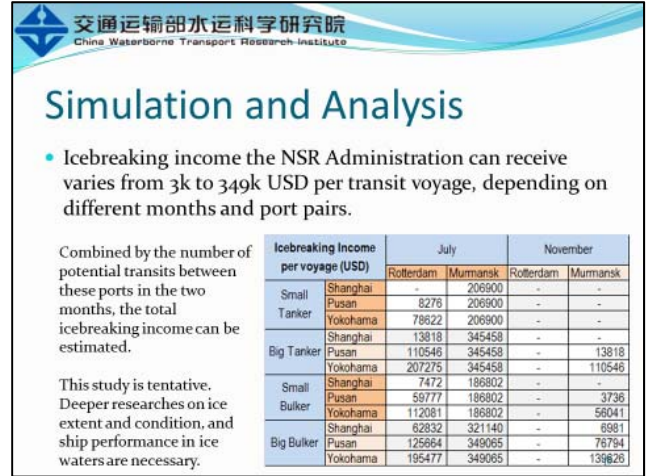


Fig.-38



Fig.-39

(2) Cheng Baozhi (Shanghai Institutes for International Studies SIIS)
 “Recent Development on China’s Policy towards Arctic Governance”



Fig.-1



Fig.-2



Fig.-3

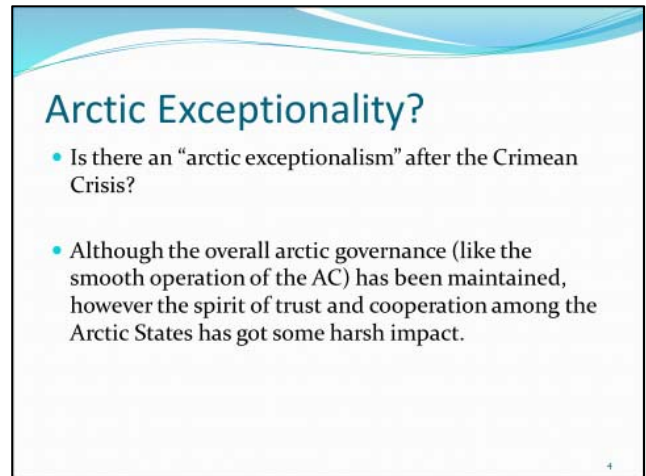


Fig.-4



Fig.-5

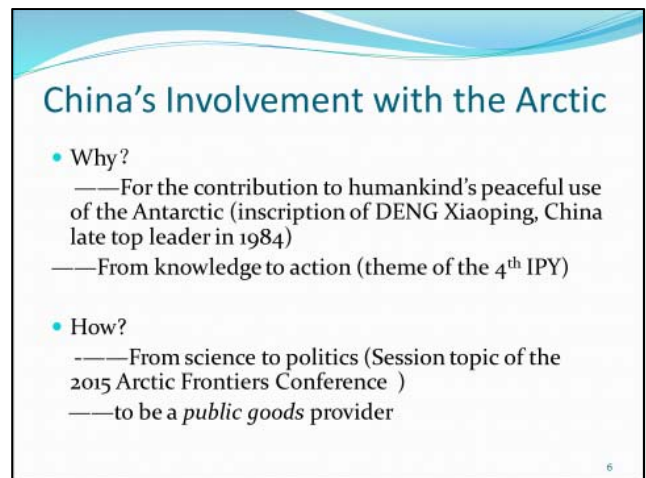


Fig.-6

Not a “New Comer” for Polar Research

- Polar Scientific Research
 - 32 Antarctic expeditions since 1984
 - 6 arctic expeditions since 1999
 - 5 scientific research bases (“Yellow River” Station in arctic)
 - XUE LONG (Snow Dragon) Icebreaker + a new Icebreaker with Finnish Aker Arctic Technology in 2017(?)
 - Research plane and other facilities/equipment

Fig.-7

Administrative Framework

- PRIC (Polar Research Institute of China) and CAA (China Arctic and Antarctic Administration) under the State Oceanic Administration (SOA) are the major steward bodies directly on arctic issues
- At working level, an interagency liaison framework was also established (MFA, SOA, Ministry of Transportation, Ministry of Finance, National Commission of Reform and Development, Ministry of Education, Ministry of Science and Technology.....)

Fig.-8

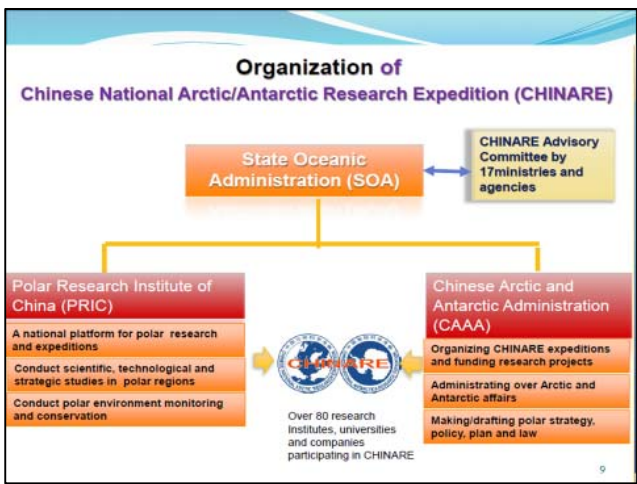


Fig.-9

Three Fundamental Concepts

—Speech by FM WANG Yi, 2015/10/17, Reykjavik

- **Respect:** China respects Arctic countries' sovereignty, sovereign rights and jurisdiction in the Arctic, and the traditions and culture of Arctic indigenous people.
- **Cooperation:** wide range of areas including climate change, scientific research, environmental protection, shipping, sustainable development and people-to-people exchanges.
- **Win-win:** The future development of the Arctic bears on the common destiny of mankind. China is ready to work with all parties to share opportunities, jointly meet challenges and strive for win-win results.

Fig.-10

Major Development since 2013

- Arctic shipping development and potential linkage with The OBOR
- China's investment in Yamal LNG Project
- Establishment and Operation of China Nordic Arctic Research Center(CNARC)

Fig.-11

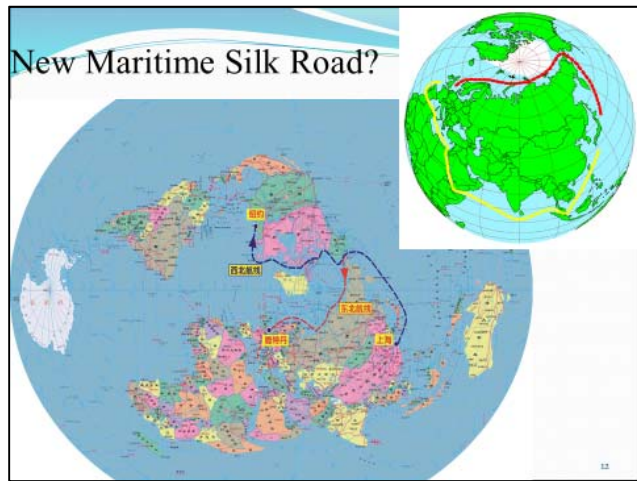


Fig.-12



Fig.-13

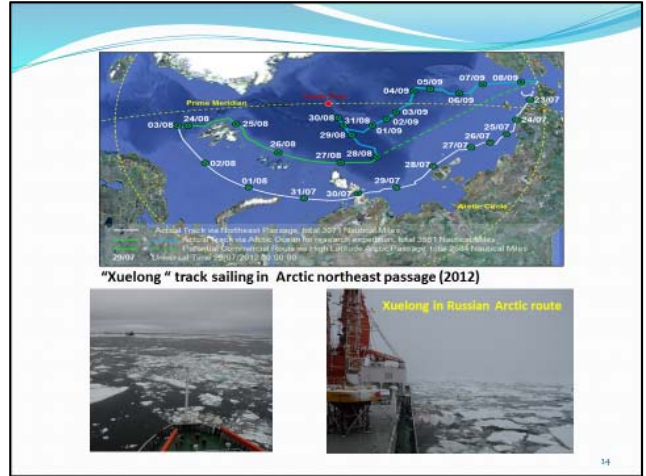


Fig.-14



Fig.-15

One Belt One Road Initiative & Potential Linkage with the Arctic

- The Silk Road Economic Belt and the 21st-century Maritime Silk Road, also known as One Belt One Road (OBOR), was an initiative that focuses on improving connectivity and creating new trading routes passing through over 60 countries across Asia, Europe, the Middle East, and Africa. The OBOR consists of two main components, i.e., the land-based Silk Road Economic Belt and the oceangoing Maritime Silk Road.

The Silk Road Economic Belt is a land route designed to connect China with Central Asia and Europe. The aims of the land route are: (1) to build a logistics chain from the east coast of China to Europe, and (2) to develop economic corridors that connect China. The 21st-Century Maritime Silk Road is a sea route that runs west from the east coast of China to Europe through the South China Sea and the Indian Ocean, and east to the South Pacific Ocean. The aim of the sea route is to build efficient transport routes between major ports in various countries.

Fig.-16



Fig.-17

- The blueprint of the OBOR initiative is connecting the vibrant East Asia economic circle at one end and the developed European economic circle at the other, and encompassing countries with huge potential for economic development. One of the key objectives of the OBOR initiative is to increase connectivity and economic development along both the land-based and oceangoing routes through the movement of goods, services, information, and people.

Fig.-18

Yamal LNG

- Yamal is a liquefied natural gas project located deep in the Russian Arctic, a region that is ice-bound for seven to nine months during the year and where the sun remains beneath the horizon for three months at a time.
- **Project type:** LNG
Operator: Yamal LNG
Partners: Novatek(50.1%), CNPC(20%), Total (20%) and China Silk Road Fund(9.9%)
Start date: 2017
- 16.5million metric tons: Yamal's annual LNG production capacity

Fig.-19

- To facilitate the logistics, the port of Sabetta and an airport were built and are now operational. Over the next three years, the port of Sabetta will take delivery of 150 modules representing 450,000 metric tons, transported from Asia by some 20 vessels. The port will also serve to export the LNG.
- NOVATEK and China's Silk Road Fund (SRF) have concluded a framework agreement on the acquisition by SRF—a \$40-billion medium- to long-term investment fund—of a 9.9% equity stake in the Yamal LNG project in Sept. 2015.

Fig.-20



Fig.-21



Fig.-22

- **Purpose**
 - To increase awareness, understanding and knowledge of the Arctic and its global impacts
 - To promote cooperation for sustainable development of the Nordic Arctic and coherent development of China in a global context
- **Activities**
 - China-Nordic Arctic Cooperation Symposium
 - CNARC Fellowship / Internship Program
 - CNARC Publication Program
 - Joint Research Project

Fig.-23

- **member institutes**
 - Nordic member institutes*
 - Arctic Centre of the University of Lapland (Finland)
 - Fridtjof Nansen Institute (Norway)
 - Icelandic Center for Research (Iceland)
 - Nordic Institute of Asian Studies (Denmark)
 - Norwegian Polar Institute (Norway)
 - Swedish Polar Research Secretariat (Sweden)
 - Chinese member institutes*
 - Center for Polar and Oceanic Studies, Tongji University
 - Research Institute of Polar Law and Politics, Ocean University of China
 - Shanghai Institutes of International Studies
 - Strategic Studies Division, Polar Research Institute of China
 - Shanghai Jiao Tong University Centre for Polar and Deep Ocean Development (SJTU-PADOD Centre)

Fig.-24

Some Personal Thoughts

- A public goods provider for Arctic governance, not only of labor, capital, infrastructure, but also on capacity building and regime development;
- Building trust through international cooperation, whether bilaterally or multilaterally;
- Well/harmonious interaction among the governments at all levels, State owned/private companies and the local people.
- Future cooperation areas may cover shipping, ship-building, satellite mapping and survey, port facilities construction, and capacity training for search & rescue, etc.;
- Concepts shifting/acceptance: sustainability, resilient community, social cohesion, clean energy, green development, "soft law" governance,

25

Fig.-25

• *Many Thanks and
Comments Welcome!*

26

Fig.-26

(3) Woouk Choi and Seungdo Ra(Institute of Russian Studies(IRS), Hankuk University of Foreign Studies (HUFS))
 “IRS Arctic Research: Scopes and Perspectives”



Fig.-1



Fig.-2



Fig.-3



Fig.-4

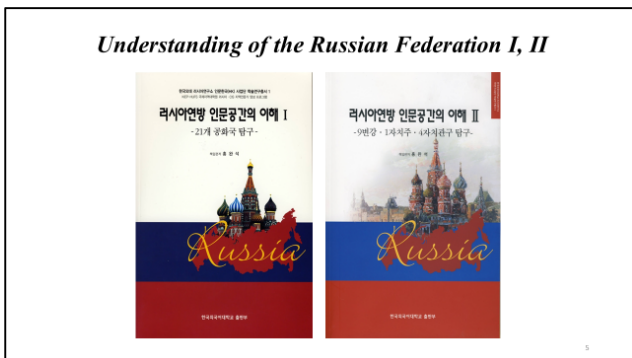


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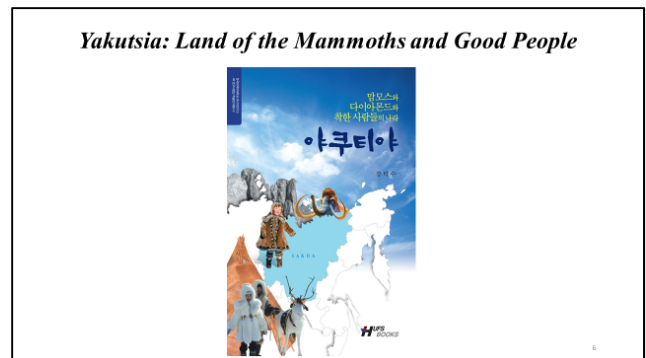


Fig.-6



Fig.-7

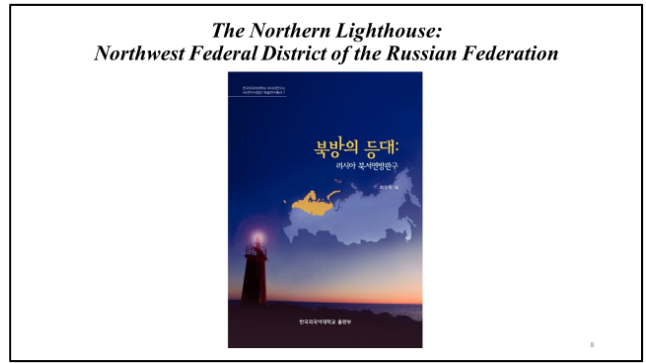


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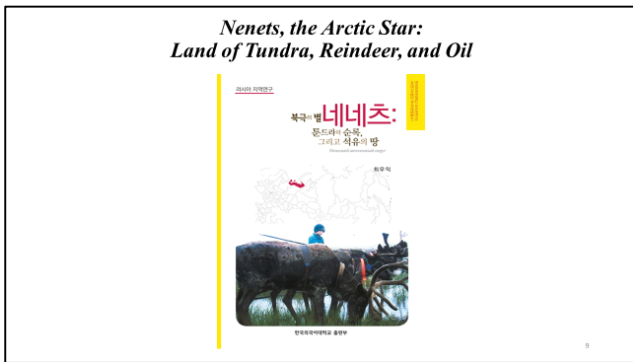


Fig.-9



Fig.-10



Fig.-11



Fig.-12

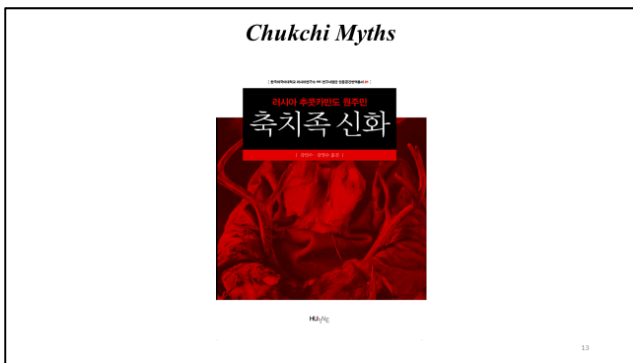


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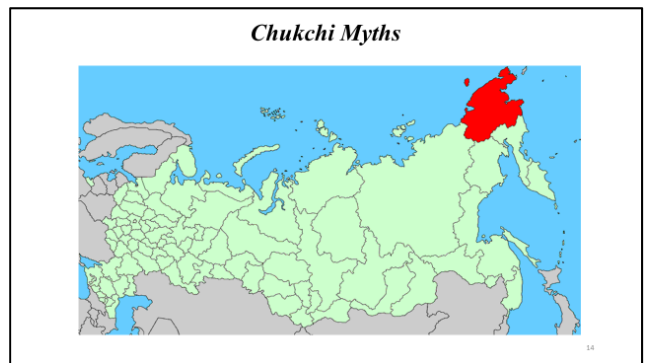


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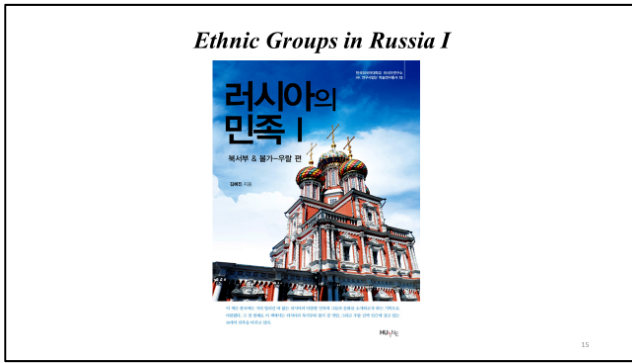


Fig.-15

1. IRS Activities on Arctic Research

- ❖ Research Projects on the Arctic
 - Arctic Partnership for International Research and Education (PIRE): Promoting Urban Substantiality in the Arctic
 - On April 2016, the IRS began to conduct a joint research project "Promoting Urban Substantiality in the Arctic" with its counterpart organization "Arctic Research Coordination Network" based at Institute for European, Russian, and Eurasian Studies at George Washington University. For now, 14 university research centers, government organizations and institutes from 4 countries are participating in the project, which was granted with a budget of 3 million dollars for 5 years by the US government.

Fig.-16

1. IRS Activities on Arctic Research

- ❖ Research Projects on the Arctic
 - Strengthening International Cooperation in the Arctic
 - The institute participated in a short-run project granted with a budget of \$ 250,000 for 7 months by the Korean Ministry of Foreign Affairs.
 - The project participants offered an analysis of Russian Arctic strategy and held an international conference on the Arctic governance (local) and an international forum for the Arctic Business (abroad).

Fig.-17

1. IRS Activities on Arctic Research

- ❖ Forum & Conference
 - The First Sakha-Korean Arctic Business Forum
 - Date: July 22, 2015
 - Location: Sakha Republic, Russian Federation
 - Organizer: Institute of Russian Studies, Hankuk University of Foreign Studies
 - Sponsor: Ministry of Foreign Affairs
 - Participants: Mikhail Nikolaev (First President of Sakha Republic, State Duma Deputy of the Russian Federation)

Fig.-18

1. IRS Activities on Arctic Research

2015 Arctic Business Forum

Fig.-19

1. IRS Activities on Arctic Research

- ❖ Forum & Conference
 - The First International Arctic Conference "Arctic Futures: Challenges and Opportunities"
 - Date: 2015.10.29-30
 - Location: Hankuk University of Foreign Studies, Seoul, Korea.
 - Organizer: Institute of Russian Studies, Hankuk University of Foreign Studies
 - Sponsor: Ministry of Foreign Affairs
 - Participants: Chung Ui-Hwa (Speaker of the National Assembly)

Fig.-20

INTERNATIONAL SYMPOSIUM OF IRS

Arctic Futures: Challenges and Opportunities

북극의 미래 도전과 기회

October 29-30, 2015

- Organizer: Arctic Division, Institute of Korean Studies (IKS), Hankuk University of Foreign Studies
- Website: Hankuk University of Foreign Studies (HUPS), Seoul, Korea
- Sponsor: Ministry of Foreign Affairs
- Language: English, Russian, Korean

Fig.-21



Fig.-22

2. The Arctic Imagery in Russian Cinema

- The current research will focus on the imagery of the Arctic in Soviet and post-Soviet Russian cinema.
- There appeared a number of films about the Arctic in Russia.
- Some of them are well known, others are known less. One part of these films is documentary, the other one is fiction.
- The present study will take a quick look at fiction films about the Arctic region of Russia, which show views on this territory from the Soviet times up to the present.

23

Fig.-23

2. The Arctic Imagery in Russian Cinema



24

Fig.-24

2. The Arctic Imagery in Russian Cinema

- In the Soviet times, the Arctic was used as a backdrop for a adventure, propaganda, and romance in a wide variety of films.
- For example, the most famous Soviet film showing the Arctic adventure is *The Seven Brave Ones* (*Semero smelykh*, 1936), which is one of the most important films made by Sergei Gerasimov.
- The film tells the tale of seven explorers sent on a Soviet geological expedition to the Arctic lands full of perilous forces of nature.

25

Fig.-25

2. The Arctic Imagery in Russian Cinema

- The film concentrates its focus on the lively image and limitless potential of the fearless and selfless members of the expedition and their devotion to duty for the greater good of the collective.
- They extend Soviet advanced civilization to its most remote and unfavorable places, using scientific principles.
- The film demonstrates how young explorers and scientists civilize the Arctic landscape by imposing socialist modernity in the northern periphery of the Soviet Union.

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Fig.-26

2. The Arctic Imagery in Russian Cinema



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Fig.-27

2. The Arctic Imagery in Russian Cinema

- Aleksei Simonov's *Ordinary Arctic* (*Obyknovennaia Arktika*, 1974) focuses on the theme of heroic lives and efforts on the Arctic frontier.
- The film depicts the Arctic as a land of great construction project in which the explorers realize their creative ideas for the bright future of Soviet socialism.
- The heroic struggle to build gleaming cities of the new socialist world is associated with the desire to transform the Arctic into an ideal space of Soviet civilization.

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Fig.-28

2. The Arctic Imagery in Russian Cinema



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Fig.-29

2. The Arctic Imagery in Russian Cinema

- Aleksei Popogrebskii's film *How I Ended This Summer* (*Kak ia provel etim letom*, 2010) tells the story of an uneasy and unstable cohabitation of the two characters on an isolated meteorological station in Chukotka.
- As the conflict erupts between an older man, Sergei, and a younger man, Pavel, the film subverts the so-called Arctic myth in which explorers and scientists were often portrayed as positive heroes and depicted as members of an extended family.

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Fig.-30

2. The Arctic Imagery in Russian Cinema



Fig.-31

2. The Arctic Imagery in Russian Cinema

- Aleksandr Mel'nik's film *The Territory* (*Territoriia*, 2015) tells the adventure tale of explorers sent on a geological survey and gold prospect team to the Soviet Union's far northeast, a vast region called the Territory.
- The film creates a mythic landscape of heroism where every man and woman can become a hero. Indeed, explorers show heroic effort in overcoming all kinds of hardships.
- They endure extreme conditions with a tenacious spirit and unusual passion in the northeastern wilderness.

Fig.-32

2. The Arctic Imagery in Russian Cinema

- One of such characters is young Sergei Baklavov who sets out on a long heroic journey.
- He goes through beautiful but barren lands, ice, and rapids.
- But he undergoes a profound transformation in the mythic landscape of heroism which is a vital part of the Arctic culture from the Stalinist 1930s up to the present.
- Triumphs in the North are translated into victories of almost cosmic significance. Interestingly enough, the survey team learns and celebrates Gagarin's flight into space.

Fig.-33

3. Northern Regions of Russia: Socio-economic Changes and Prospects

- The world has high interest in the development of northern sea routes and regions.
- But development without the premise of environmental preservation cannot be sustainable.
- This study particularly focuses on the socio-economic environment of northern residents in Russia.
- The issues faced by the residents are closely related to how successful the development and preservation of the northern regions would be.

Fig.-34

3. Northern Regions of Russia: Socio-economic Changes and Prospects



Fig.-35

3. Northern Regions of Russia: Socio-economic Changes and Prospects



Fig.-36

3. Northern Regions of Russia: Socio-economic Changes and Prospects

- **The importance of the Russian North**
 - The northern regions of Russia, which account for 70% of the total land area, produce approximately 80% oil and 90% gas as well as coal and almost half of the industrial wood. They export these resources, bringing in 2/3 foreign exchange earnings for the country.
- **Market Reforms**
 - With the beginning of market reforms in Russia during the 1990s, the northern regions went through severe difficulties in the process of adapting to new socio-economic conditions.

Fig.-37

3. Northern Regions of Russia: Socio-economic Changes and Prospects

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Fig.-38

3. Northern Regions of Russia: Socio-economic Changes and Prospects

- **Problems of the Russian North**

- Income, housing, and various social welfare services significantly decreased
- Unemployment and wage arrears
- The average life expectancy of indigenous people was lower than that of Russians by 10-11 years.
- During the period 2003-2009 alone, birth rate fell by 34%, and mortality increased by 42%.
- The ecological environment in industrial areas became extremely worse
- damage of indigenous people's settlements and social infrastructure

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Fig.-39

3. Northern Regions of Russia: Socio-economic Changes and Prospects

- Based on research conducted by some scholars, socio-economic development in the northern areas of Russia can be classified largely into **three clusters** as follows:

Cluster 1 shows the highest level of socio-economic development, consisting of three regions (Nenets, Khanty-Mansiysk, and Yamalo-Nenets Autonomous Okrug).

Cluster 2 consists of eight areas (Republic of Karelia, Komi Republic, Arhangelsk region, Murmansk region, Saha Republic, Kamchatka area, Magadan Region, and Sakhalin region) with average level of socio-economic development.

Cluster 3 consists of four areas (Evenk, Koryak, Chukotka, and Taimyr Autonomous Okrug) whose socio-economic development level is below average.

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Fig.-40

3. Northern Regions of Russia: Socio-economic Changes and Prospects

- In order **to improve the socio-economic environment** in the northern regions:

1. Preservation of the environment and improvement of ecological situation
2. Improvement of living conditions: housing, utilities, and consumer services
3. Ensuring employment, development of traditional industries, fisheries
4. Medical and sanitary-epidemiological welfare
5. Development of communication system
6. Provision of housing for citizens who travel from the Far North.
7. Spiritual revival of indigenous people in the North.
8. Strengthening the material and technical bases for agriculture and fisheries

41

Fig.-41

3. Northern Regions of Russia: Socio-economic Changes and Prospects

- **Prospects:**

The northern areas of Russia are expected to develop as described below depending on their geographical locations: Northern Europe, northern part of Western Siberia, northern part of Eastern Siberia, and northern part of Far East.

1. The socio-economic development of the **European North** is associated with the prospects of reconstruction and modernization, export capacity or potential of leading industrial complexes such as fuel and energy, military-industrial, and wood chemistry.

42

Fig.-42

3. Northern Regions of Russia: Socio-economic Changes and Prospects

2. The economy of **Western Siberia** is based on the development of the country's largest oil and natural gas.

3. North **Eastern Siberia** is rich in mineral resources, including ores of nonferrous metals and significant reserves of iron ore and gold ore.

4. The socio-economic situation in the north of the **Far East** at the present time can be defined under the concept of federal target, "Programs of socio-economic development of the Far East and Trans-Baikal."

43

Fig.-43

3. Northern Regions of Russia: Socio-economic Changes and Prospects

- **Research Project:**

→ Research on regions in Russia has been very active since the 2000s. Note, however, that few studies are available regarding northern regions particularly on the development and preservation issues of the regions.

→ Accordingly, based on previous studies, future research needs to concentrate on the North Pole Route and the possibility of resource development in the northern regions as well as **on the sustainable development and preservation of these regions.**

44

Fig.-44

(4) Kang, KukJin (Korea Research Institute of Ships and Ocean Engineering (KRISO))
 “Recent Research Status of KRISO Ice Tank”



Fig.-1

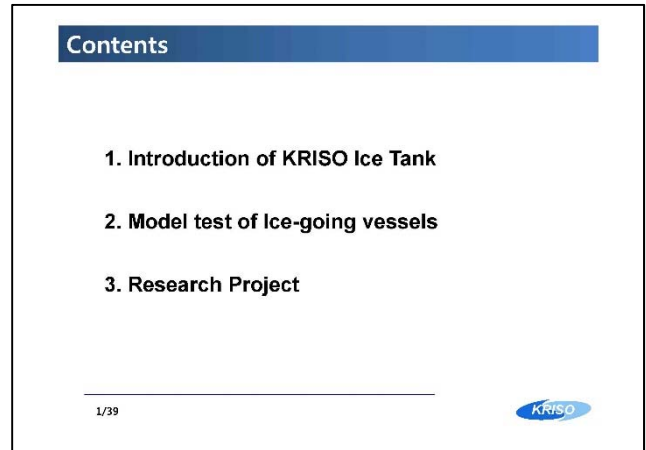


Fig.-2

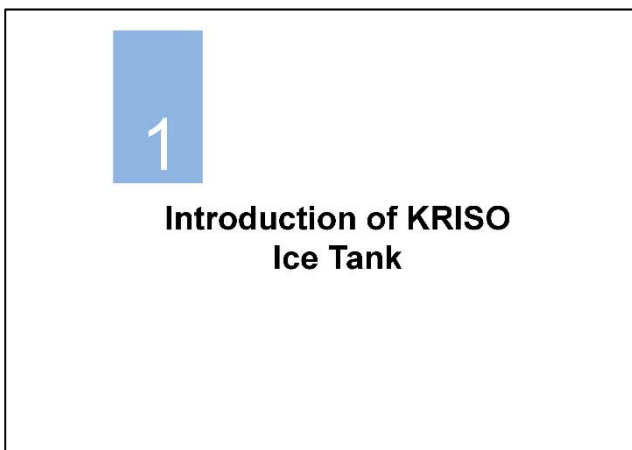


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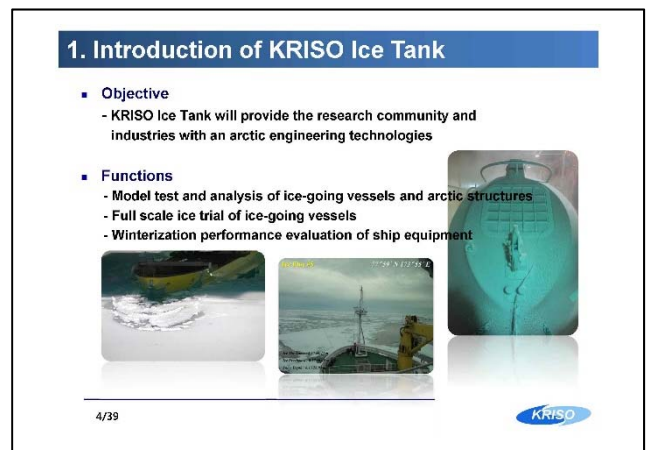


Fig.-4



Fig.-5



Fig.-6



Fig.-7

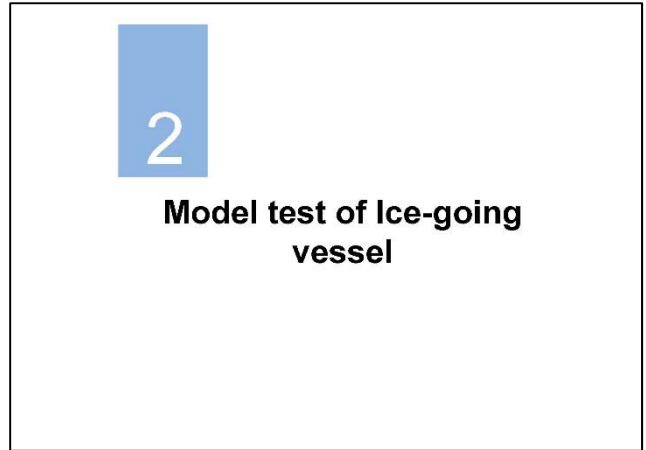


Fig.-8



Fig.-9

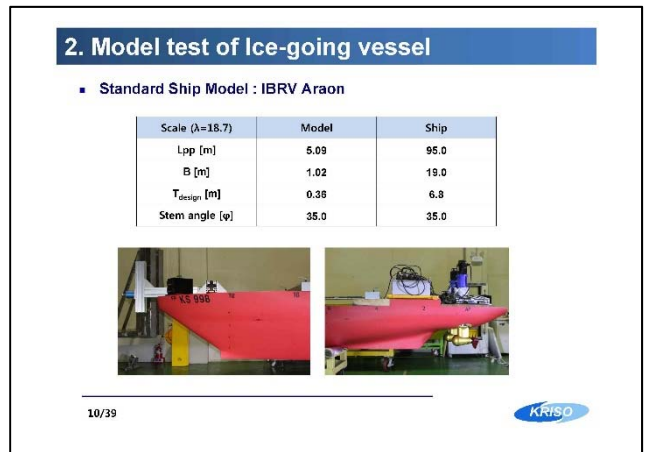


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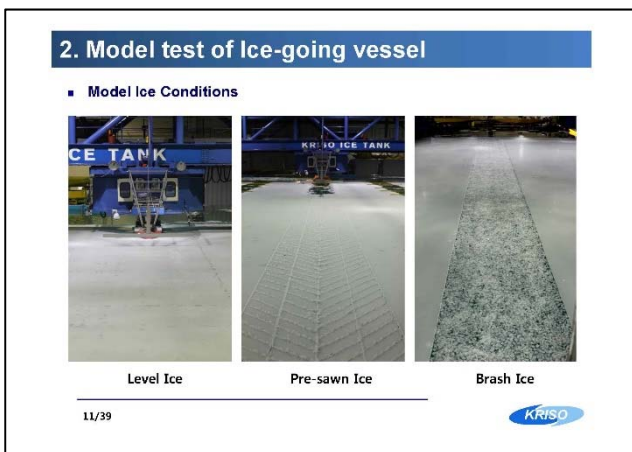


Fig.-11

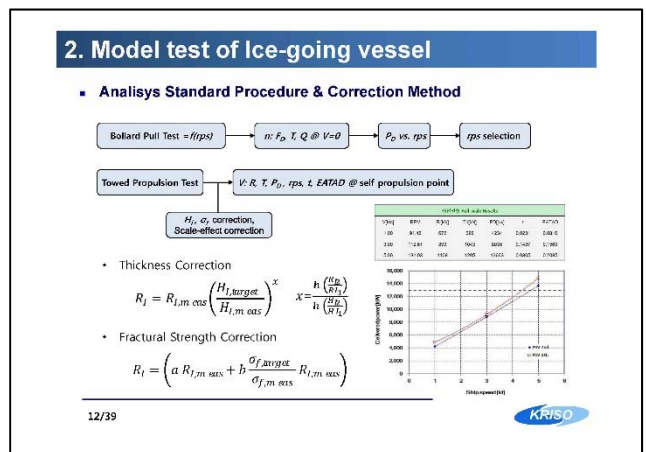


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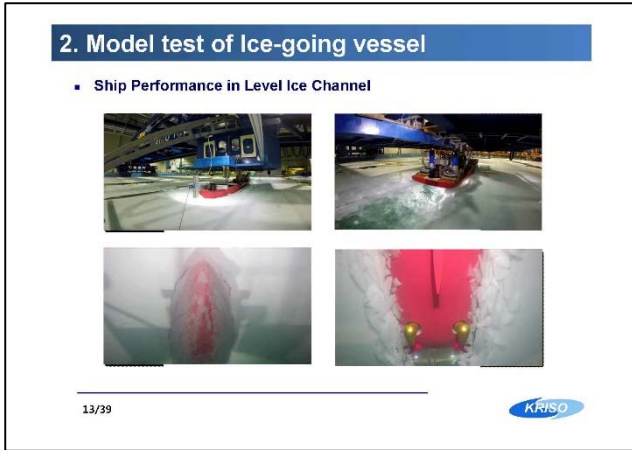


Fig.-13



Fig.-14



Fig.-15



Fig.-16

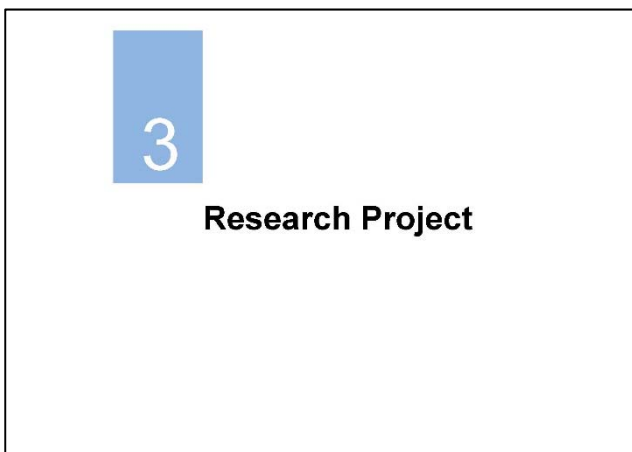


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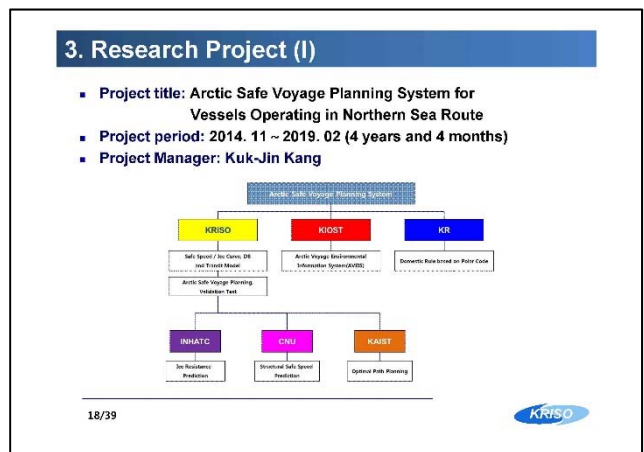


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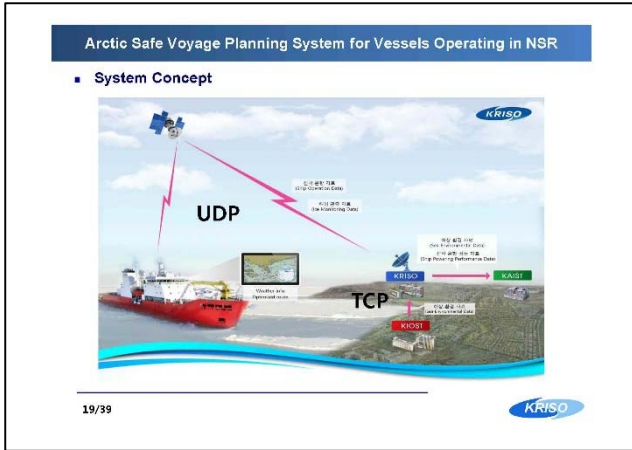


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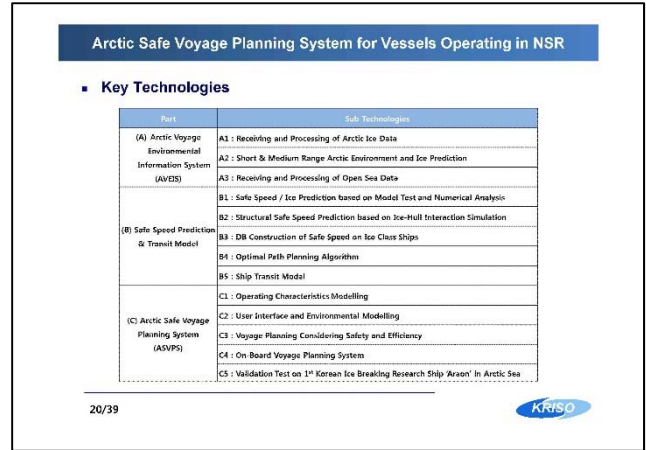


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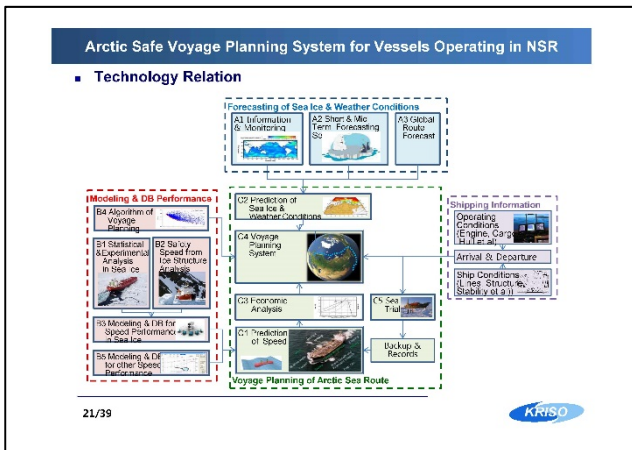


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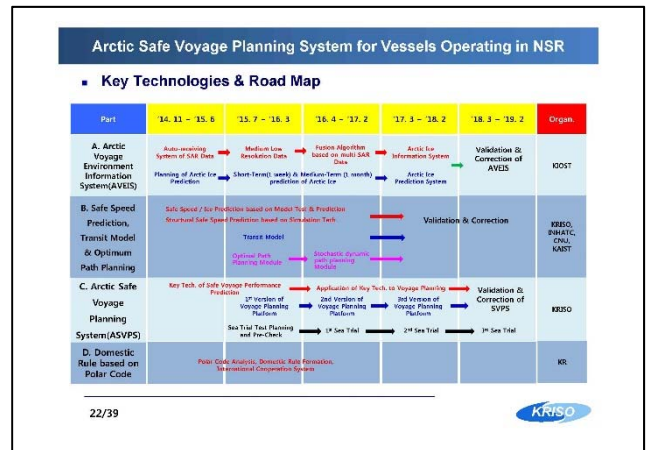


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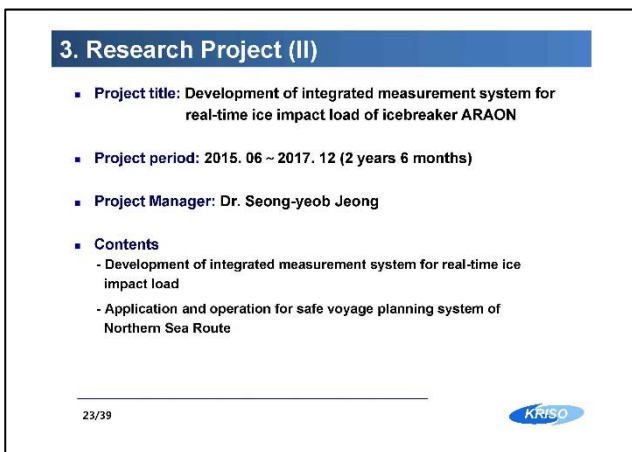


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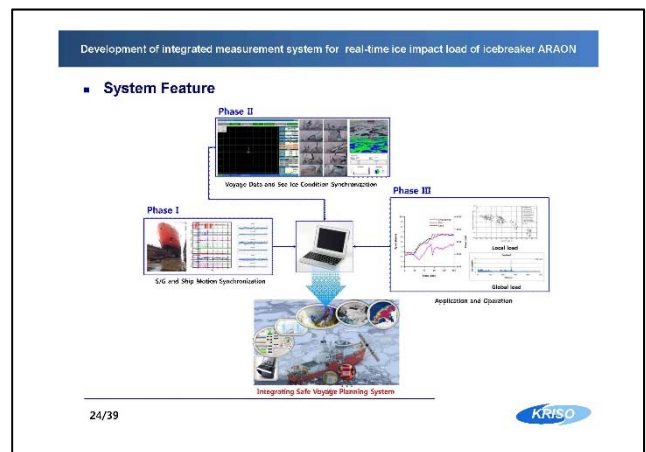


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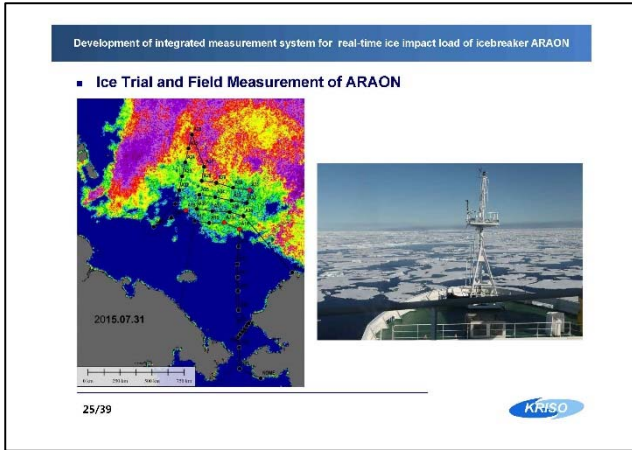


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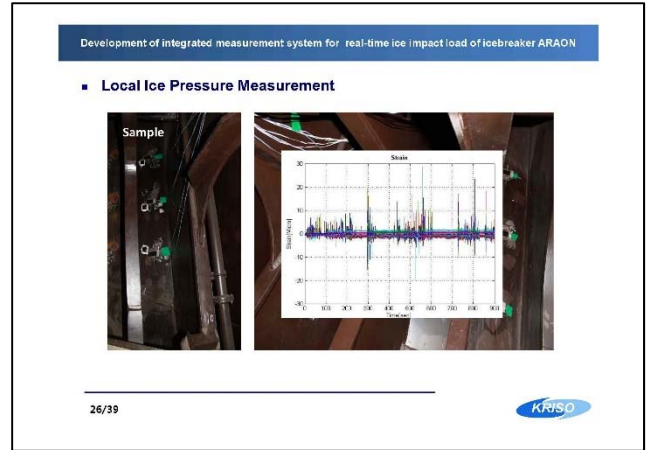


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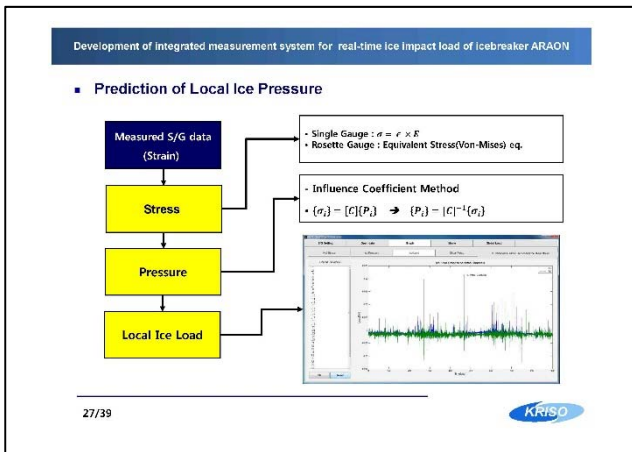


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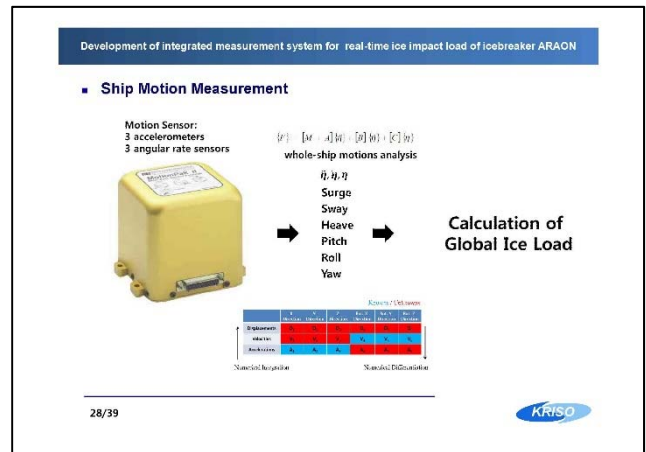


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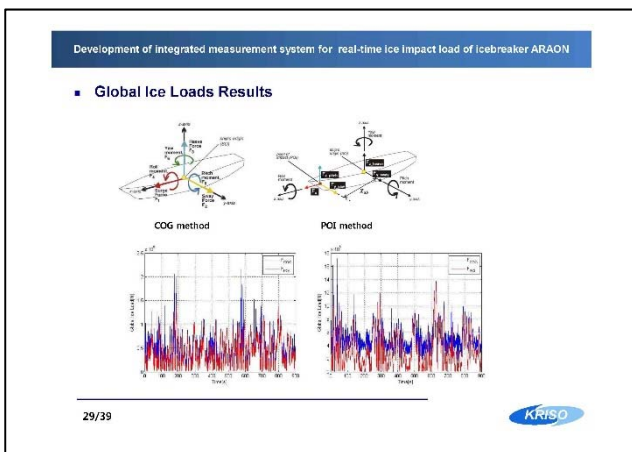


Fig.-29



Fig.-30

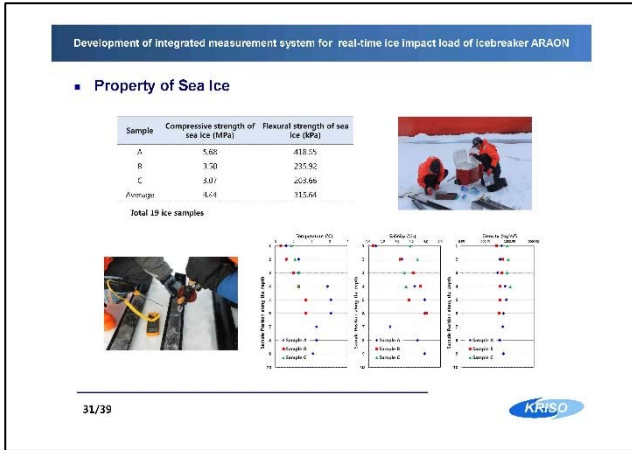


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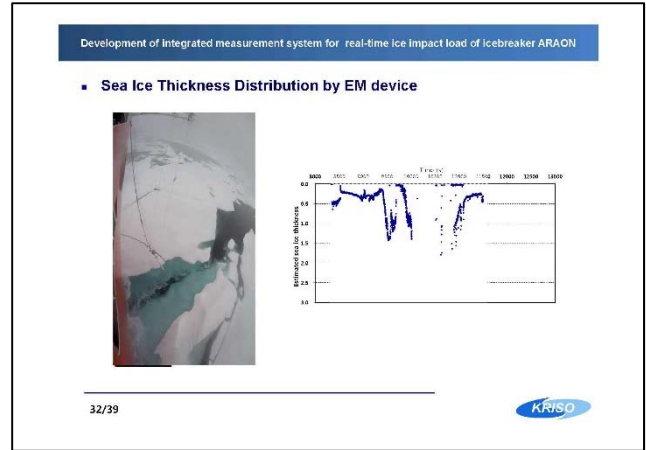


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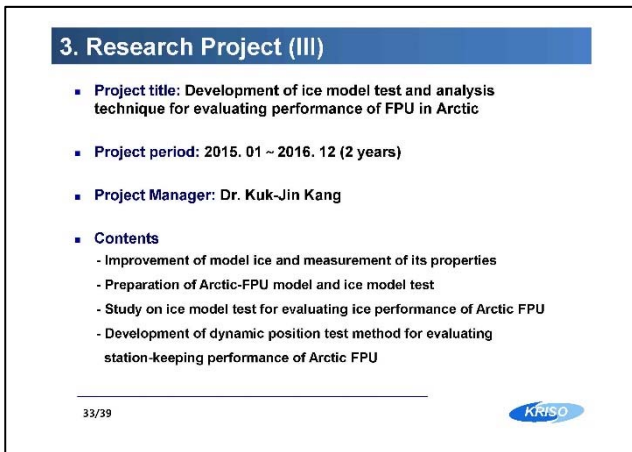


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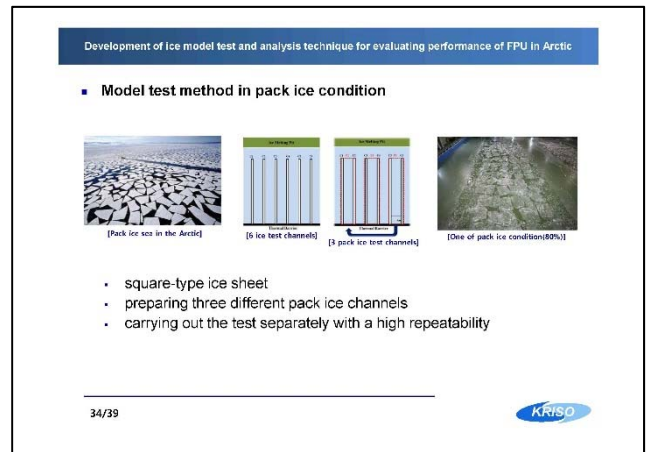


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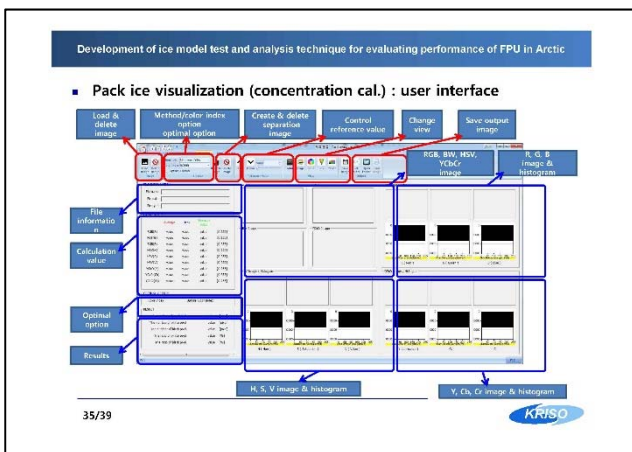


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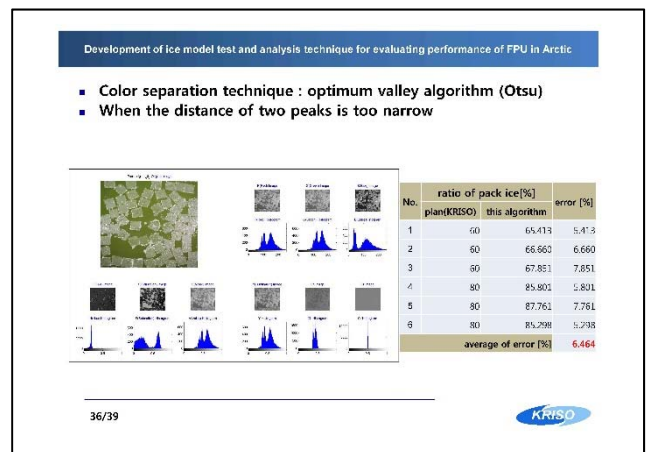


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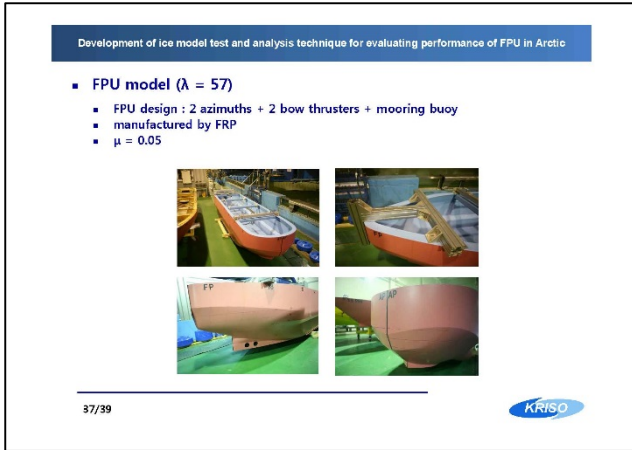


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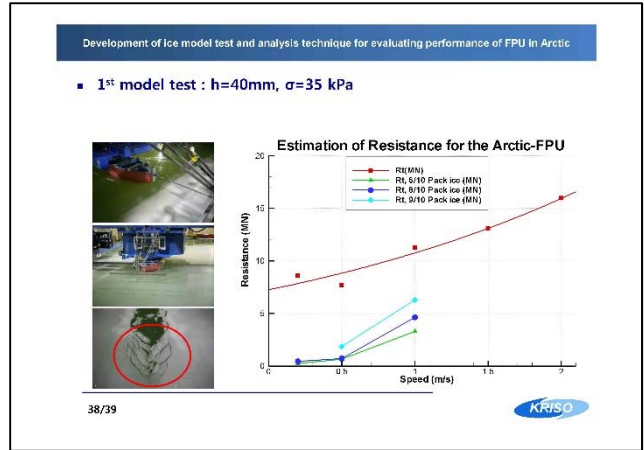


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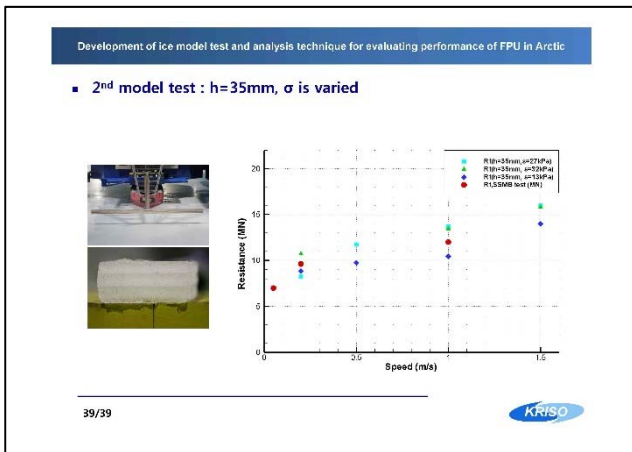


Fig.-39



Fig.-40

(5) Hyun-Soo Kim(Inha Technical College(ITC))
 “Brief Introduction of ice engineering R&D work regarding Floating structure in Korea touched by Inha Technical College”



Fig.-1

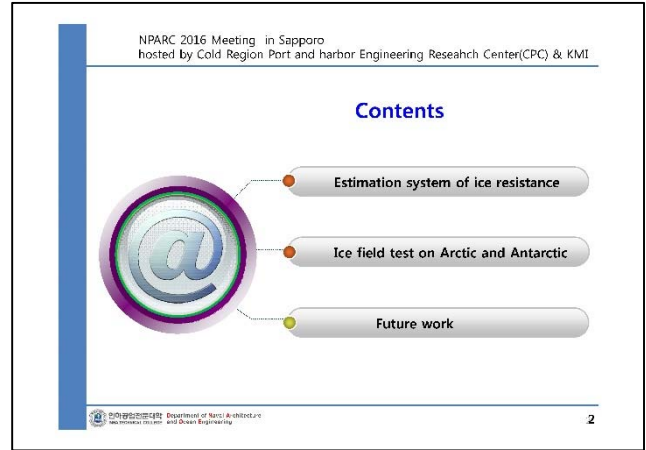


Fig.-2

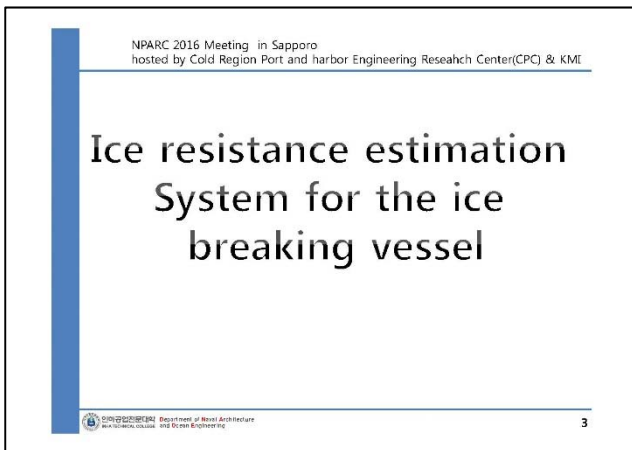


Fig.-3



Fig.-4

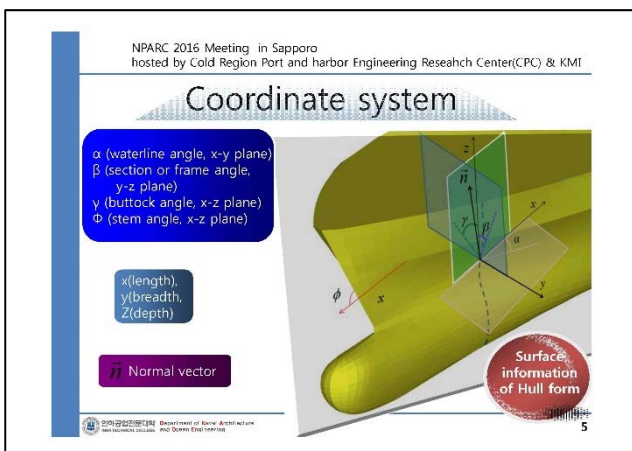


Fig.-5

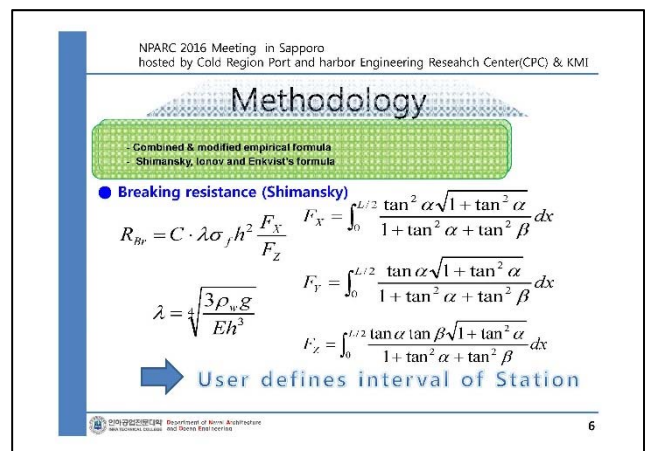


Fig.-6

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Breaking Resistance Shlimansky Method

$$R_{Br} = C \cdot \lambda \sigma_f h^2 \frac{F_x}{F_z}$$

$$\eta_1 = \frac{F_z}{F_x} \propto \frac{\tan \beta}{\tan \alpha} = \frac{1}{\tan \phi}$$

Ice breaking Parameter

$$F_z = T \eta_1$$

$$T = \frac{\lambda \sigma_f h^2}{1.93} \eta_1 \rightarrow R_{Br} = C \cdot \lambda \sigma_f h^2 \frac{F_x}{F_z} B$$

ice breaking parameter

Fig.-7

NPARC 2016 Meeting in Sapporo
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Buoyancy resistance (Enkvist)

$$R_{sp} = \frac{\rho_{\Delta} g B h \bar{l} \bar{s}}{l} = \rho_{\Delta} g B h \bar{l} \bar{s}$$

Mean concept

$$R_{sf} = f \cdot F_N = g \rho_{\Delta} A_{WL} F h \sin \beta \cdot f$$

Mean concept

$$= g \rho_{\Delta} B L_B C_{WF} h \sin \beta \cdot f$$

$$R_S = R_{sp} + R_{sf}$$

Summation of buoyancy force

Fig.-8

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Buoyancy Resistance

$$R_{sf} = \sum_0^{L/2} L_j \left(\sum_0^B f g \rho_{\Delta} b_i h \sin \beta \right)$$

$$R_{sp} = \sum_0^{L/2} L_j \left(\sum_0^B g \rho_{\Delta} b_i h s \right)$$

Summation concept

Summation of ice piece's friction and buoyancy force

Fig.-9

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Clearing resistance (IONOV)

$$R_{cl} = 2 \rho_i g h B F_{rB} [K_3 \int_0^{L/2} \frac{[y'(x)]^2}{\cos \alpha} dx + k_3 f_g \int_0^{L/2} \frac{y'(x)}{\cos \alpha} dx]$$

Diverse of solution on the stagnation point

Fig.-10

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Definition of new Clearing Plane

$$\vec{i}$$

$$\vec{n} = n_x \vec{i} + n_y \vec{j} + n_z \vec{k}$$

$$\vec{p} = \vec{i} \times \vec{n}$$

$$= \begin{pmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 0 & 0 \\ n_x & n_y & n_z \end{pmatrix}$$

$$= 0\vec{i} - n_z \vec{j} + n_x \vec{k}$$

Fig.-11

NPARC 2016 Meeting in Sapporo
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Definition of new Clearing Plane

$$\vec{d} = \vec{p} \times \vec{n}$$

$$= \begin{pmatrix} \vec{i} & \vec{j} & \vec{k} \\ 0 & -n_z & n_x \\ n_x & n_y & n_z \end{pmatrix}$$

$$= -(n_z^2 + n_y^2) \vec{i} + n_x n_y \vec{j} + n_x n_z \vec{k}$$

Define new Clearing plane

$$\xi = \tan^{-1} \left(-\frac{n_z n_y}{(n_z^2 + n_y^2)} \right)$$

Fig.-12

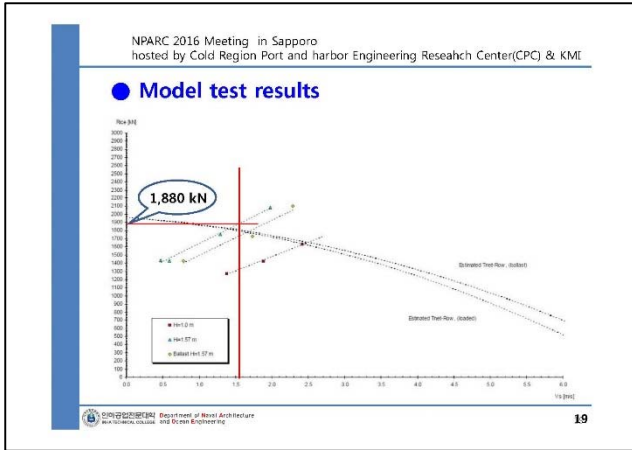


Fig.-19

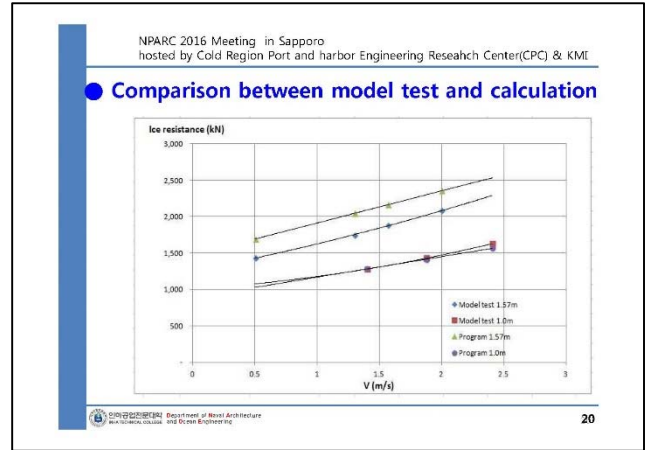


Fig.-20

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Ice field test of Korean Ice breaking Research Vessel of Araon

21

Fig.-21

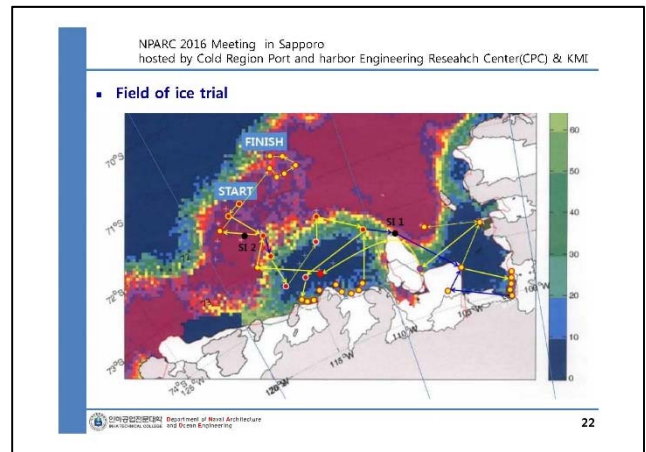


Fig.-22

NPARC 2016 Meeting in Sapporo
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Summary of general information of two big floes

Ice floe ID	SI 1	SI 2
Location	Longitude 108° 42' 9822" W Latitude 73° 28' 5867" S	Longitude 117° 50' 4123" W Latitude 72° 14' 82643" S
Size	Length (m) 900	1,100
	Width (m) 600	600
When (UTC)	Date 22 Feb 2012	4 Mar 2012
	Time 11:00	4:20
weather condition	Sunny	Cloudy
Brightness	Sunshine	Before sunset
Reconnaissance method	ship	helicopter
Test ID	A B C D E	
Power of engine(MW)	8 6 5	7 8

23

Fig.-23

NPARC 2016 Meeting in Sapporo
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Data acquisition method

Measuring items	Equipment & Method
Ice thickness	Auger, scale
Snow depth	Scale
Freeboard	Scale
Snow density	Weighting machine and constant volume device
Ice temperature	Thermometer
Ice weight and density	Weight measuring equipment
Ice Salinity	Salinity measuring device
Compressive strength	Test equipment
Flexural strength	Calculation by empirical formula
Distance	Portable GPS and scale
Latitude and longitude	GPS
Heading	Gyro
Wind speed and direction	Anemometer
Sea depth	Sounder
Power of engine	Video
RPM	Video
Thruster angle	Video
Speed (SOG)	Video
Draft	Only for reference
Air temperature	Draft gauge
	Thermometer

24

Fig.-24



Fig.-25



Fig.-26

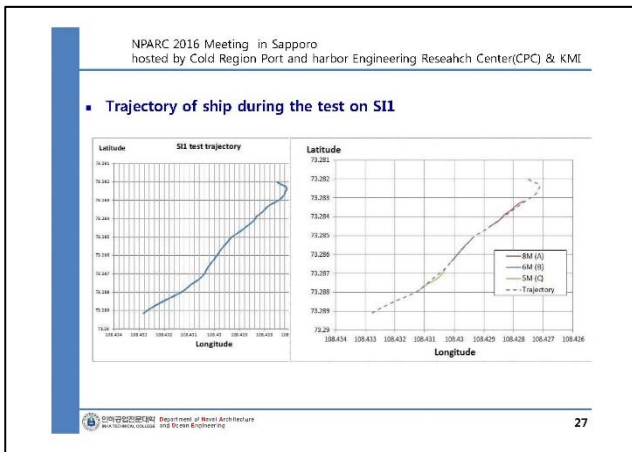


Fig.-27

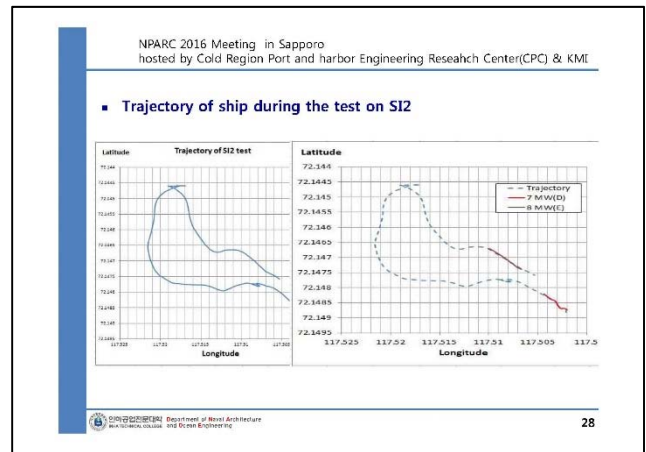


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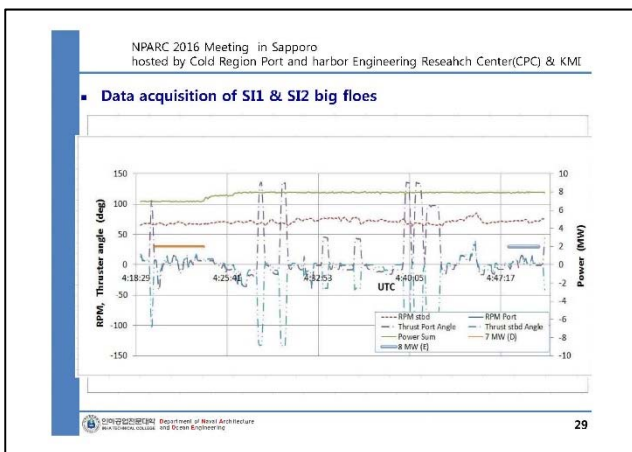


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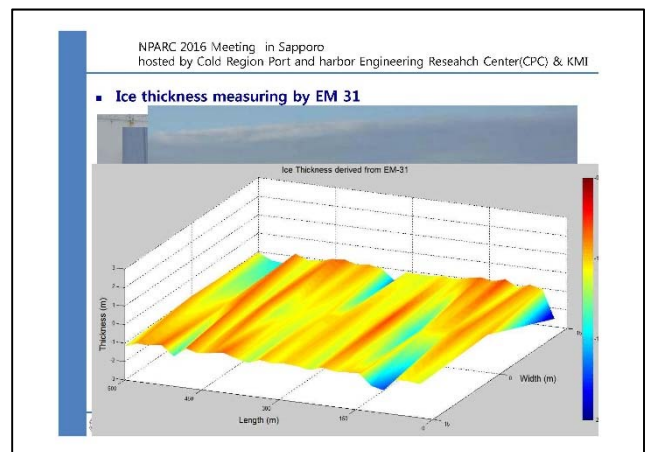


Fig.-30

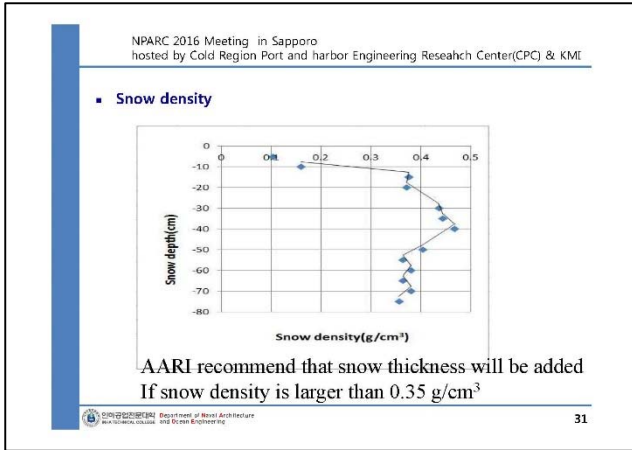


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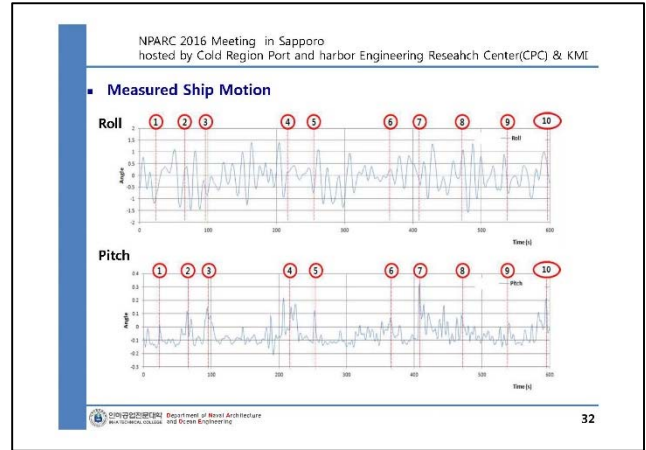


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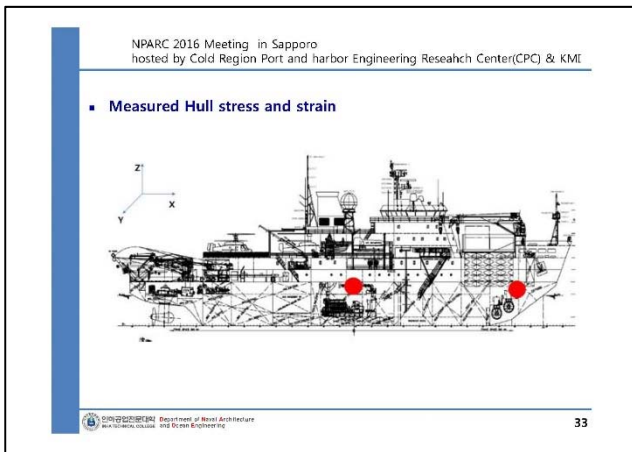


Fig.-33

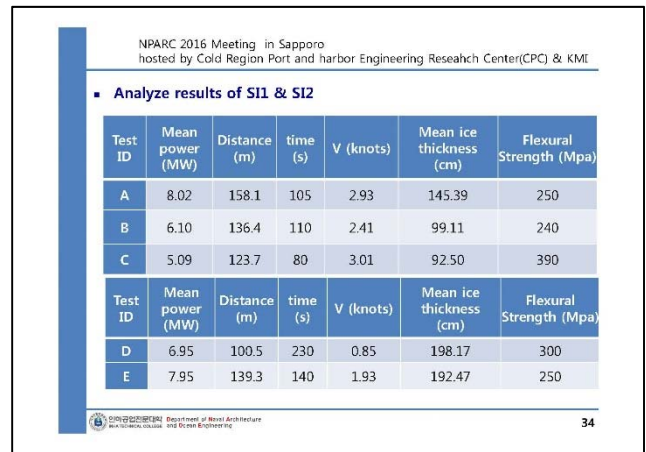


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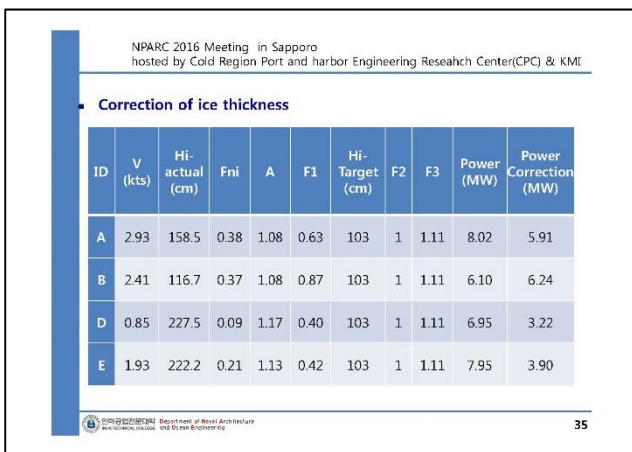


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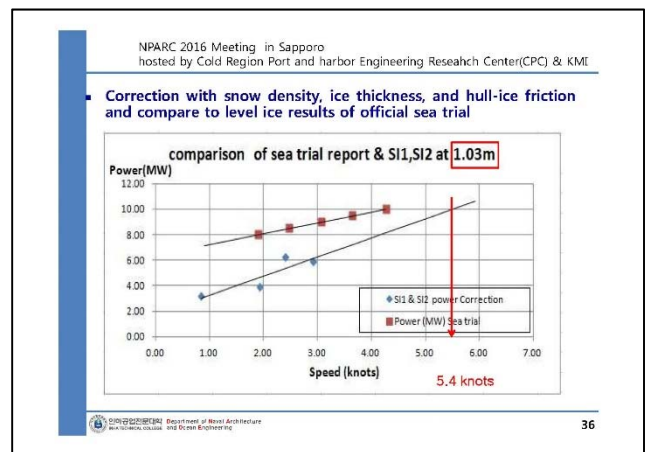


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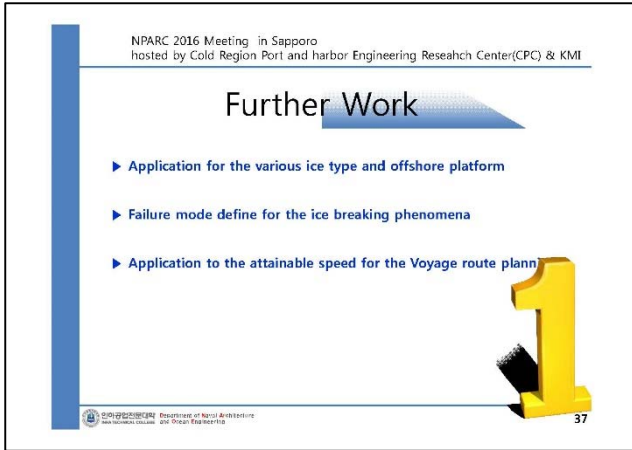


Fig.-37

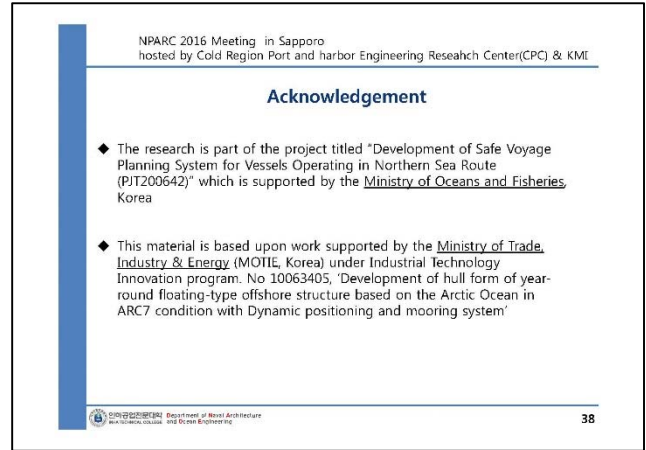


Fig.-38

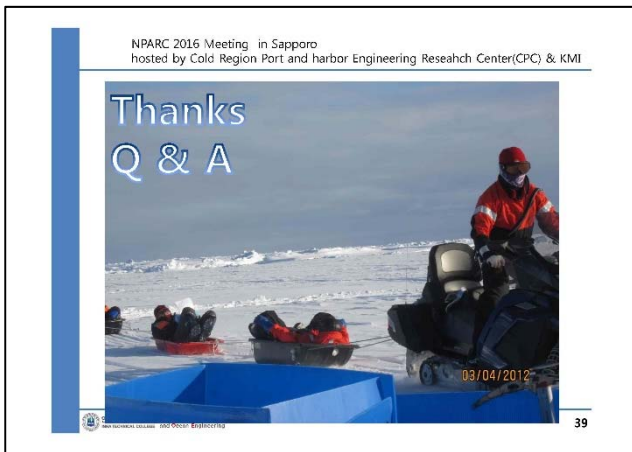


Fig.-39

(6) Jihoon Jeong (Korea Polar Research Institute (KOPRI))
 “Korea’s Scientific Activities in the Arctic”



Fig.-1

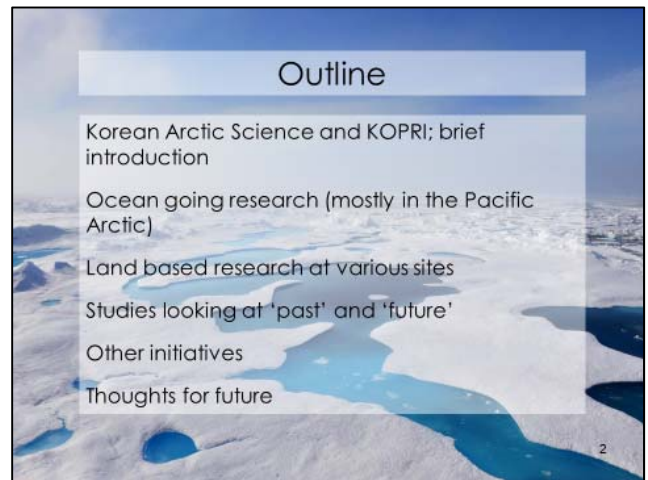


Fig.-2



Fig.-3



Fig.-4



Fig.-5

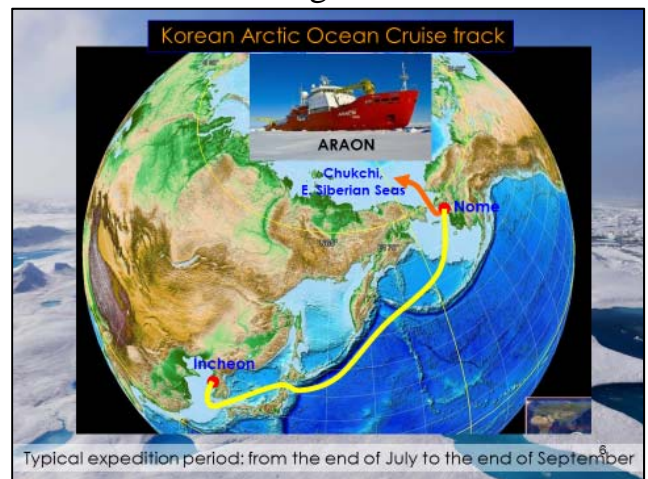


Fig.-6

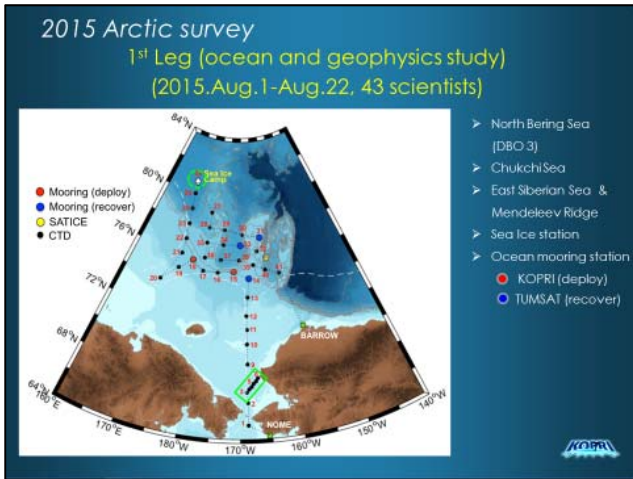


Fig.-7



Fig.-8

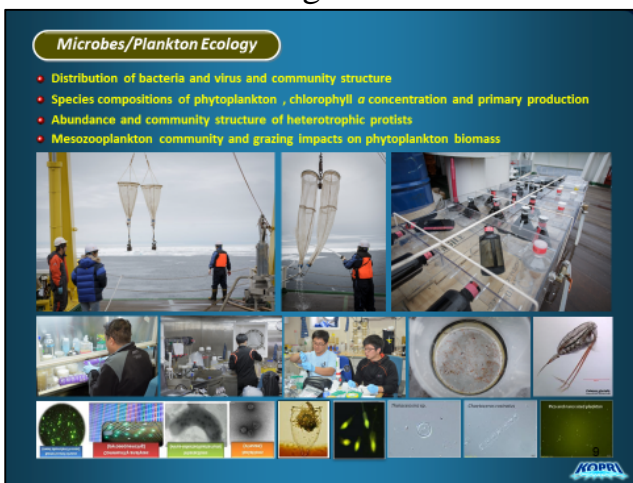


Fig.-9

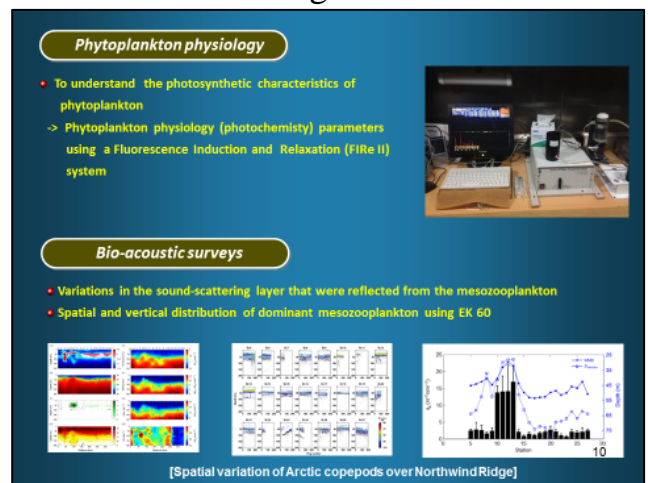


Fig.-10

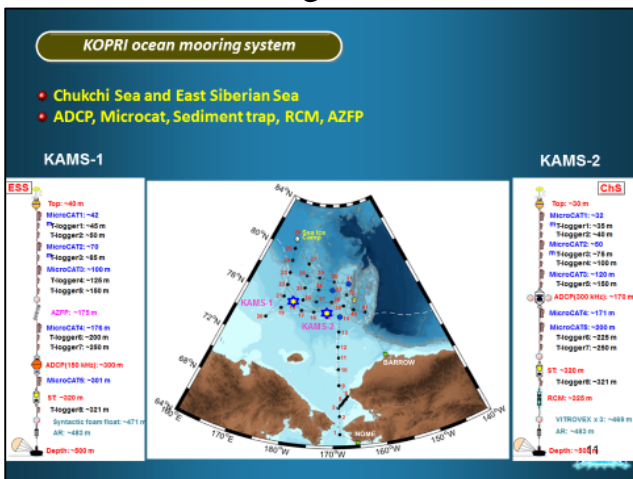


Fig.-11



Fig.-12

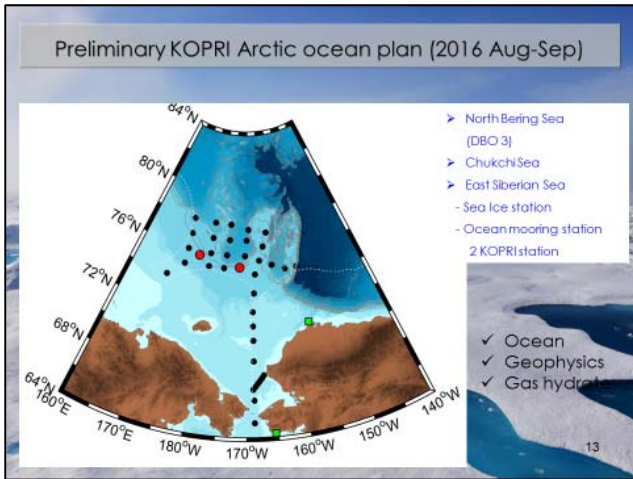


Fig.-13

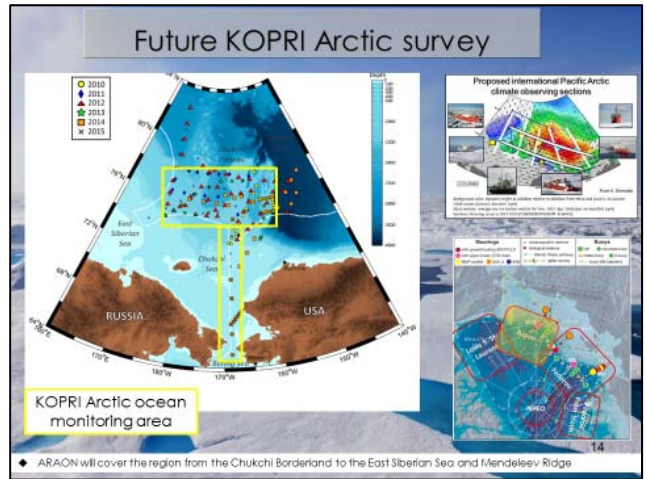


Fig.-14

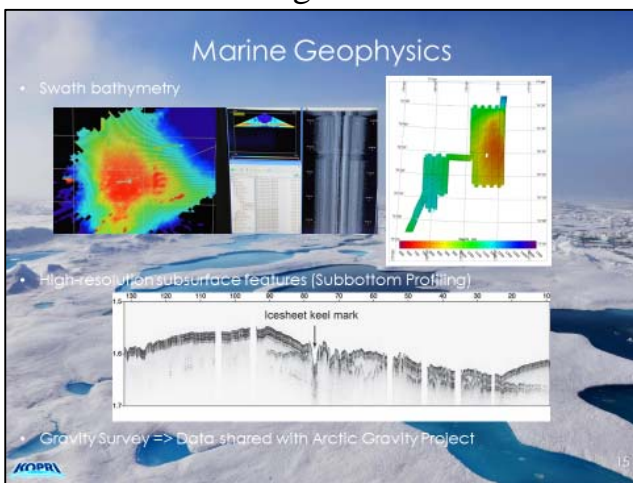


Fig.-15

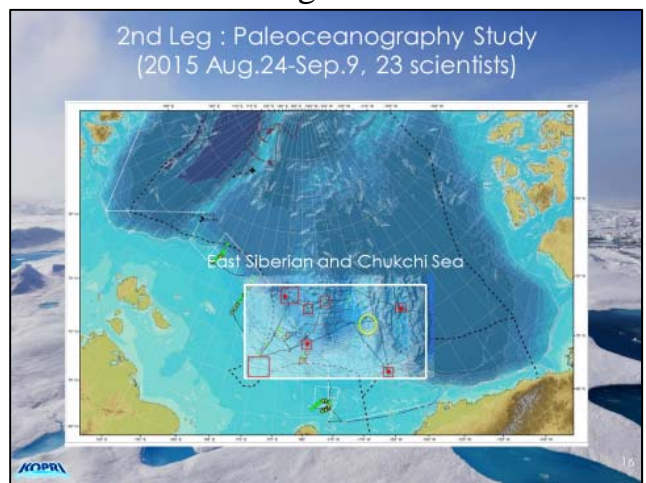


Fig.-16

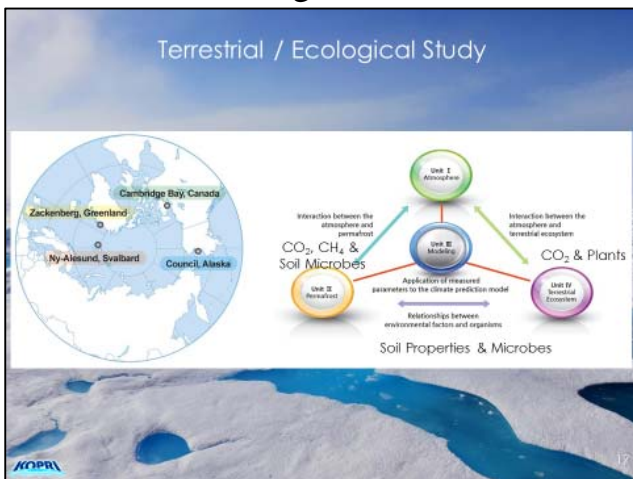


Fig.-17



Fig.-18

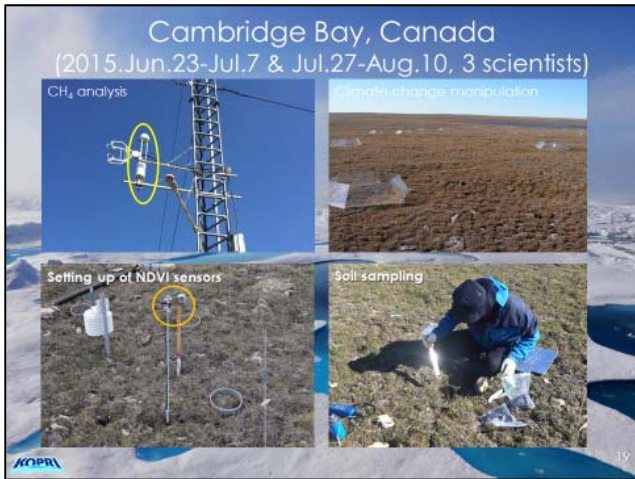


Fig.-19

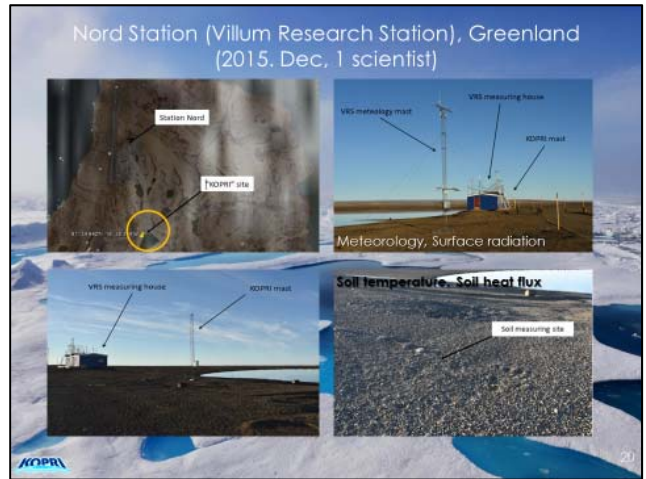


Fig.-20

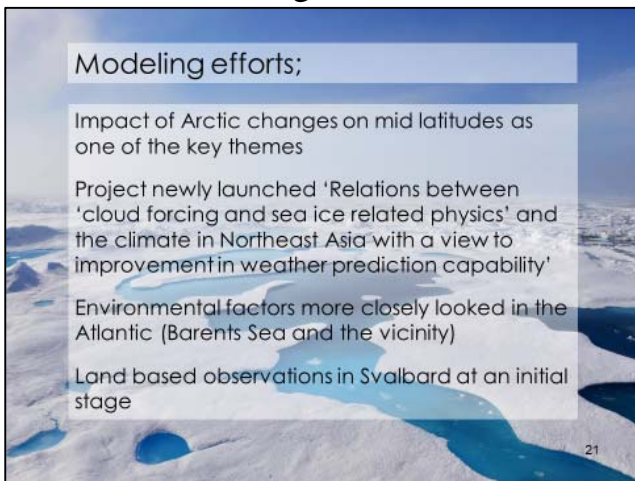


Fig.-21



Fig.-22

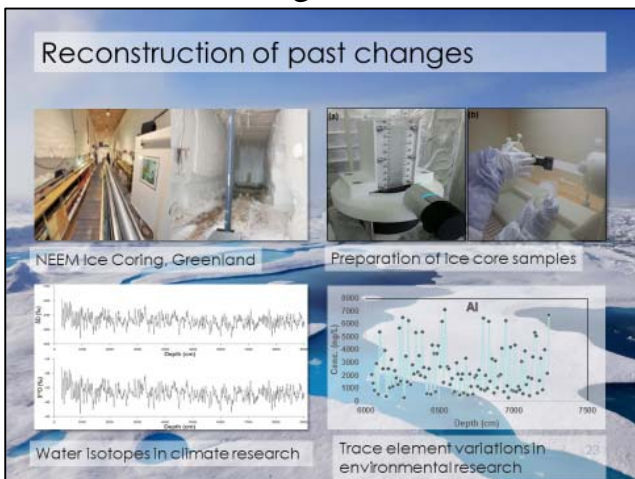


Fig.-23

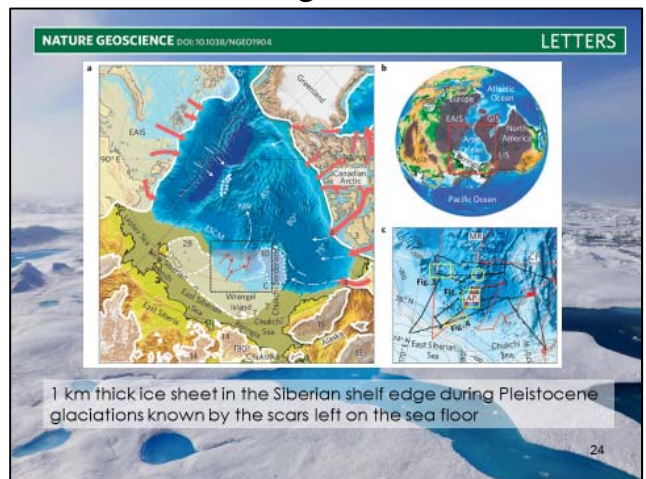


Fig.-24



Fig.-25



Fig.-26

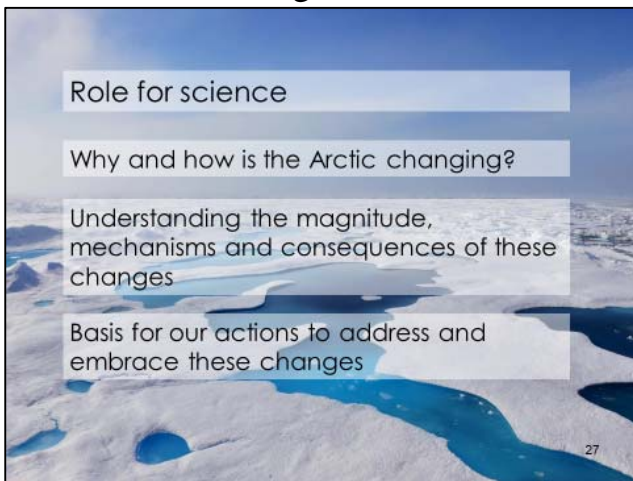


Fig.-27



Fig.-28

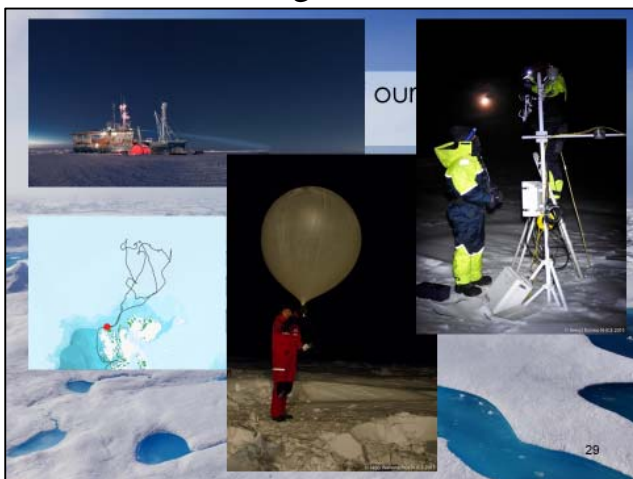


Fig.-29



Fig.-30



Fig.-31



Fig.-32


(7) Eiji Sakai (the Ocean Policy Research Institute of Sasakawa Peace Foundation (OPRI))

“Emission from Arctic Shipping Activities”

North Pacific Arctic Research Community 2016 Meeting in Sapporo

Emission from Arctic Shipping Activities

Eiji Sakai
Deputy Director
Ocean Policy Planning and Management Department

 **THE OCEAN POLICY RESEARCH INSTITUTE**
THE SASAKAWA PEACE FOUNDATION

1

Fig.-1

Transit Voyages in 2010-2015

	2010	2011	2012	2013	2014	2015
Total Volume of Transit Cargo, t	111 000	820 789	1 261 545	1 355 897	1 659 207 (gross tonnage)	292 084 (gross tonnage)
Total Number of Transit Voyages	4 (2 of them in ballast)	34 (10 of them in ballast)	46 (13 of them in ballast)	71 (22 of them in ballast)	129	27 (Sabetta excluded)





(Data: Rosatomflot)

2

Fig.-2

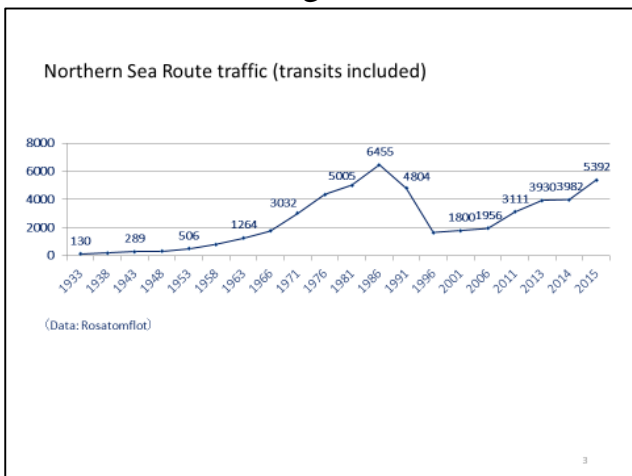


Fig.-3

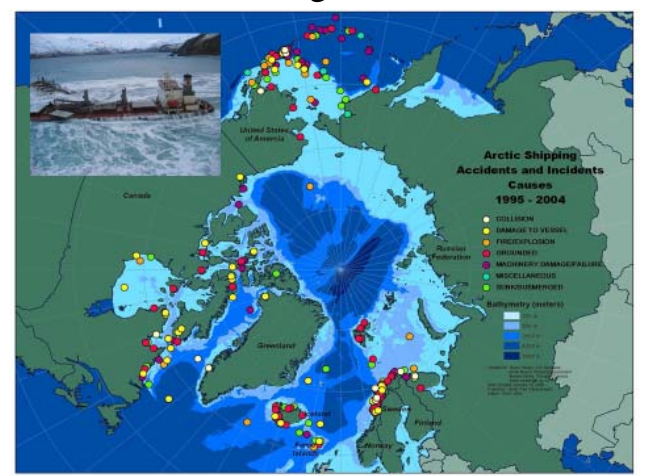






Fig.-4

Ships emit various types of pollutants during normal operation.

Such as,

- Sewage, Gray water
- Ballast Water
- Antifouling Compounds
- Noise
- Exhaust Gases

5

Fig.-5

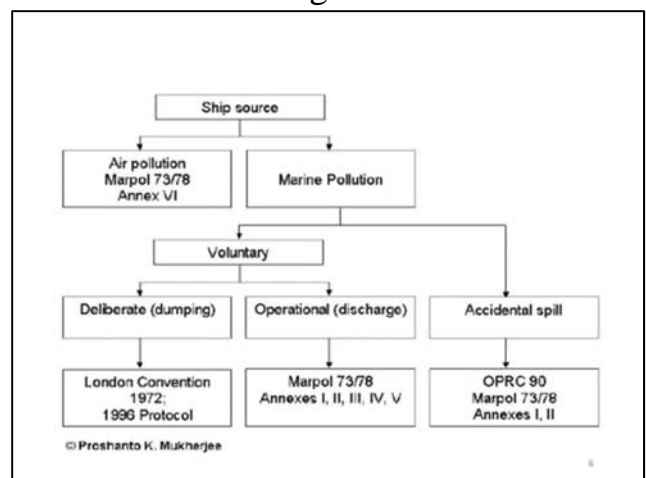


Fig.-6

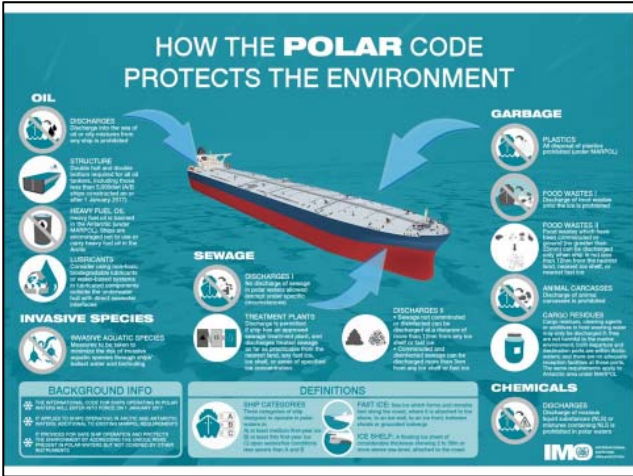


Fig.-7

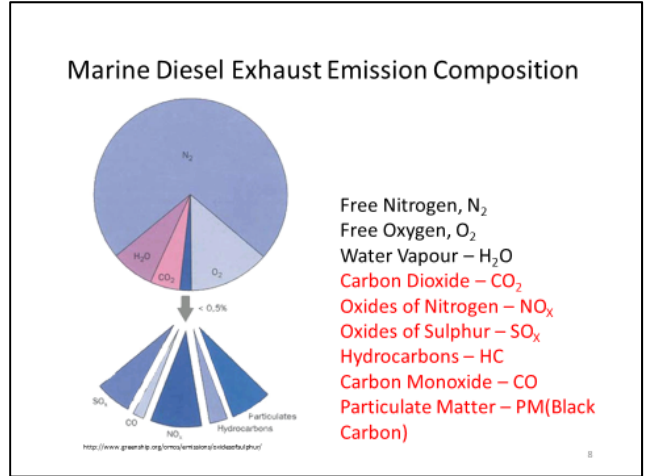


Fig.-8

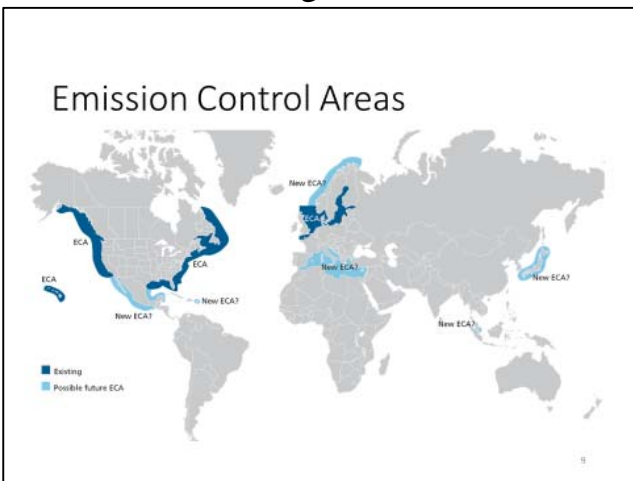


Fig.-9

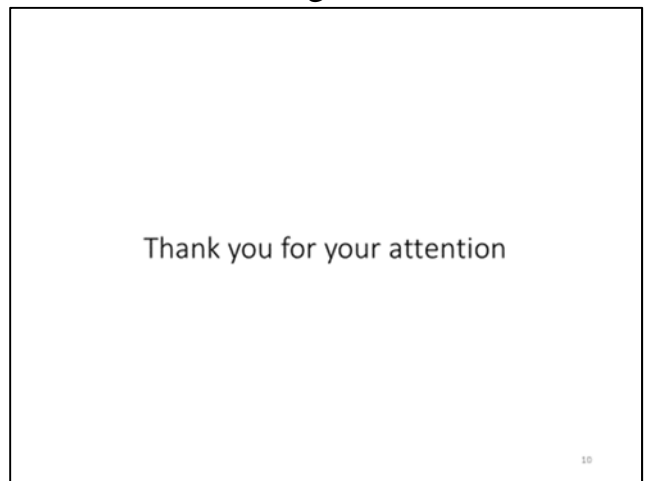


Fig.-10

(8) Koh Izumiyama (former group head at NMRI)
 “Oil Spill Problems in Ice Covered Waters”

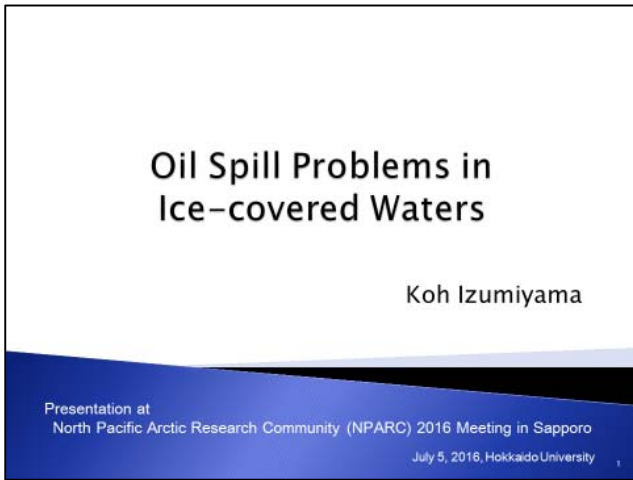


Fig.-1

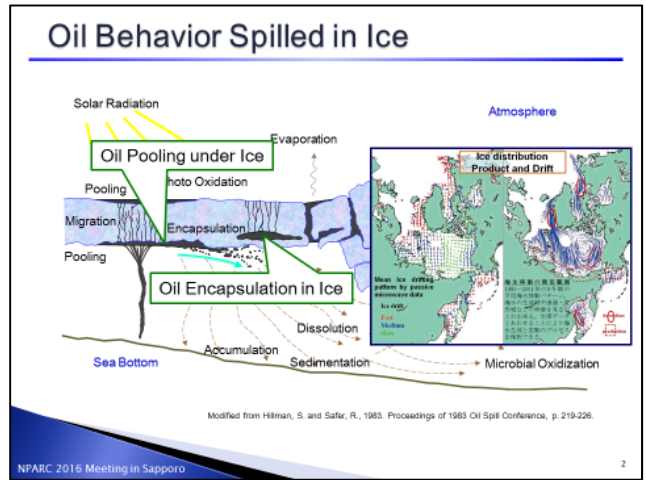


Fig.-2

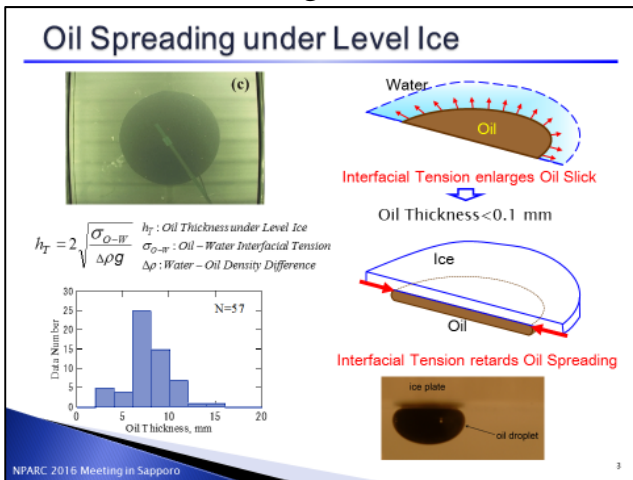


Fig.-3

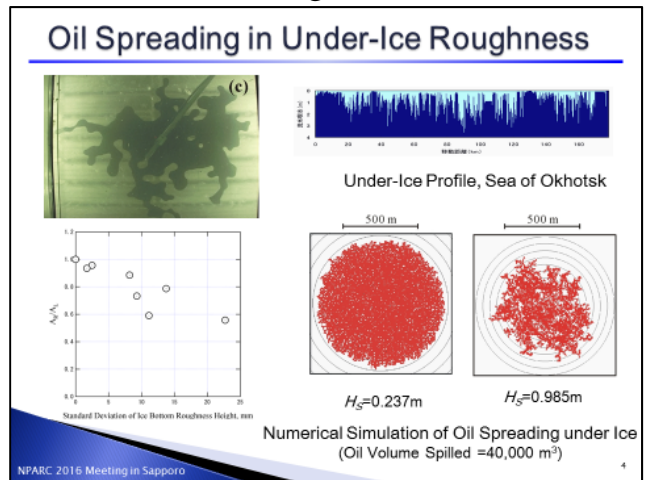


Fig.-4

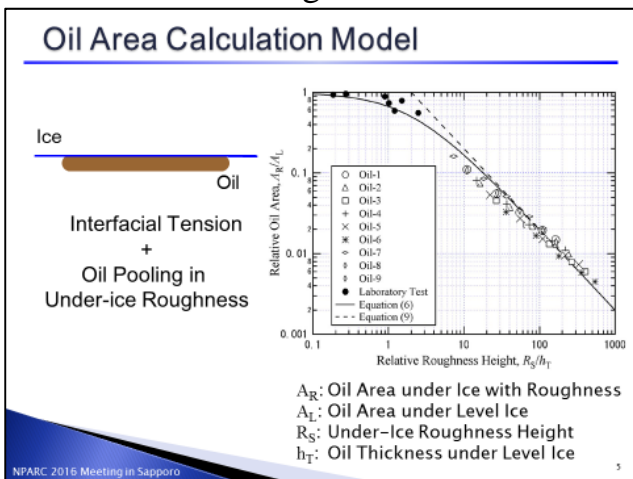


Fig.-5

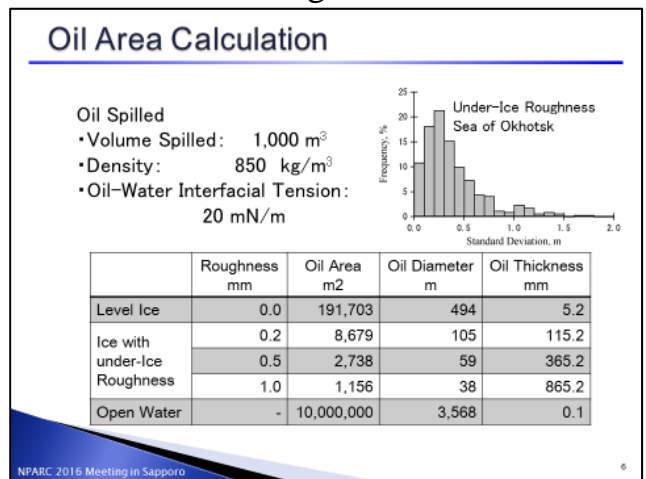


Fig.-6

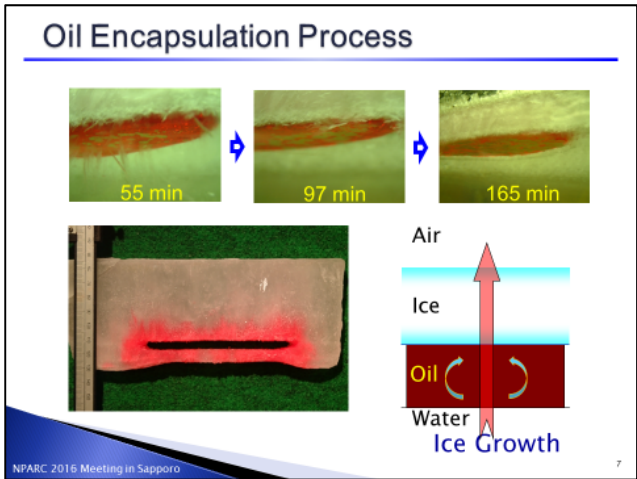


Fig.-7

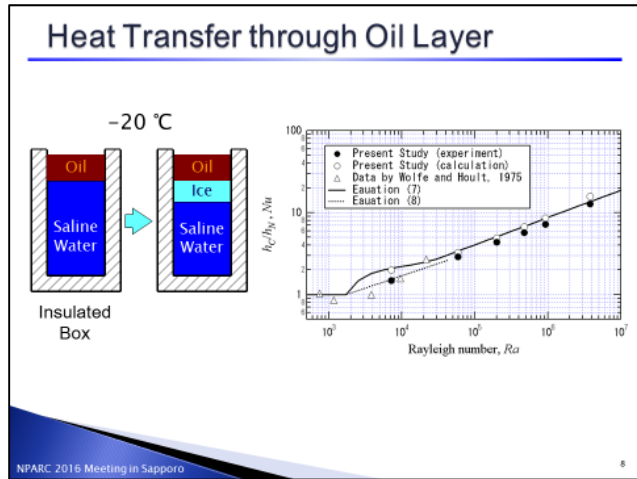


Fig.-8

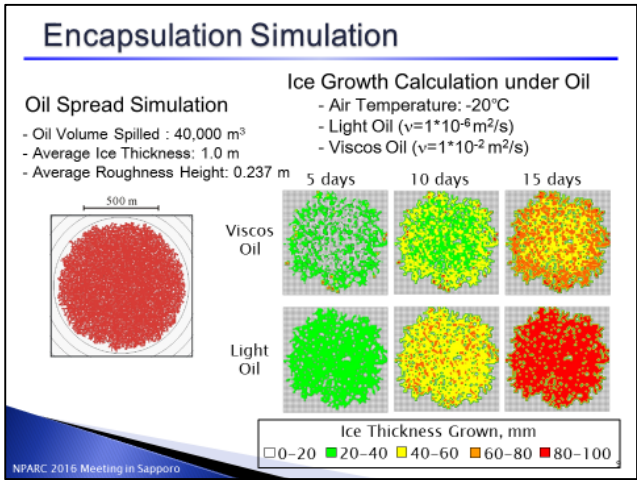


Fig.-9

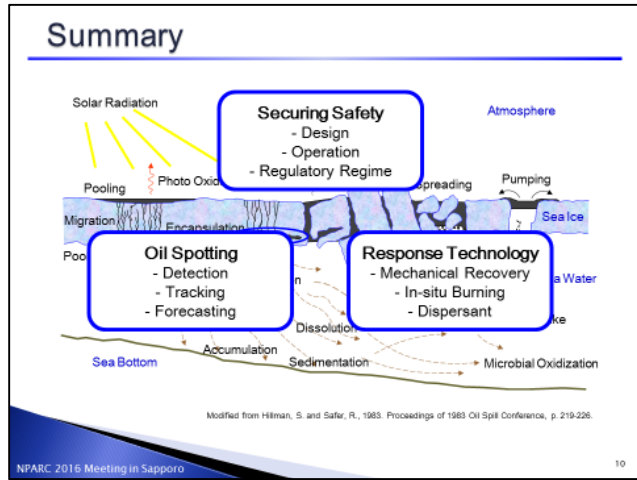


Fig.-10

(9) Natsuhiko Otsuka (CPC, ARC)

“Sustainable Use of the Northern Sea Route, Research by ArCS”

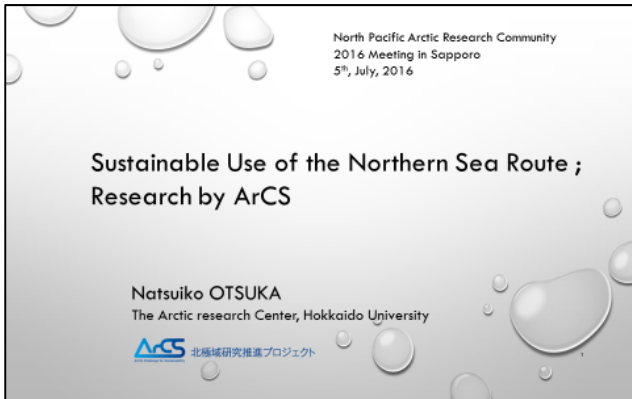


Fig.-1

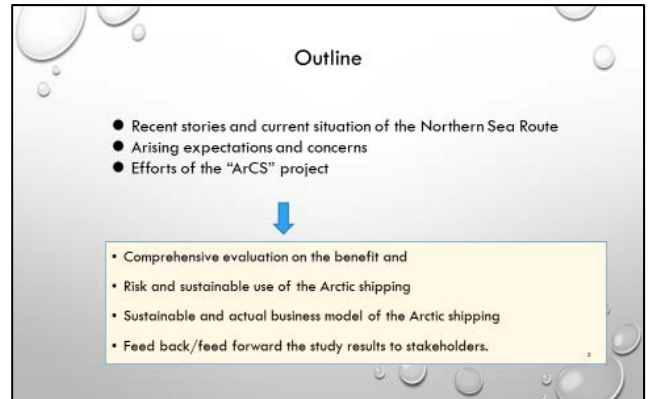


Fig.-2

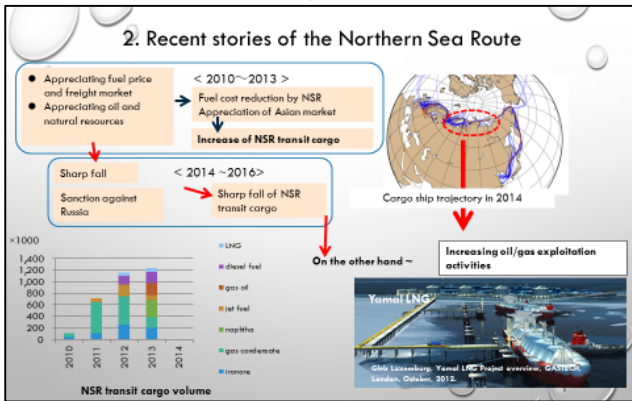


Fig.-3

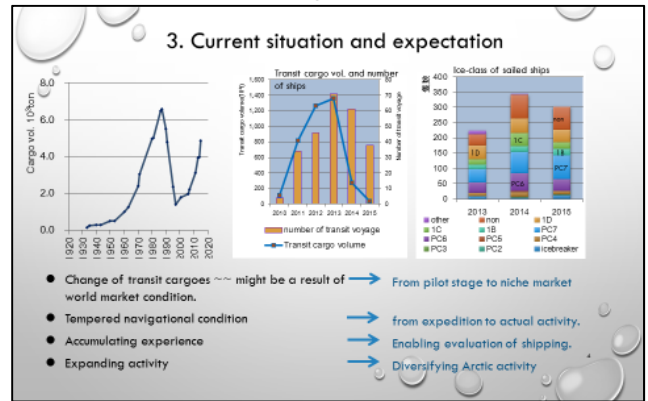


Fig.-4

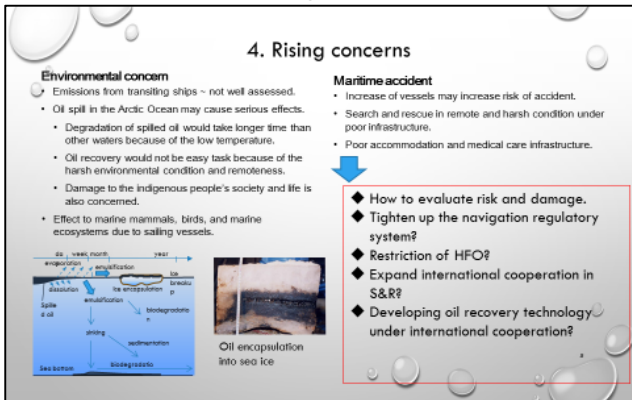


Fig.-5

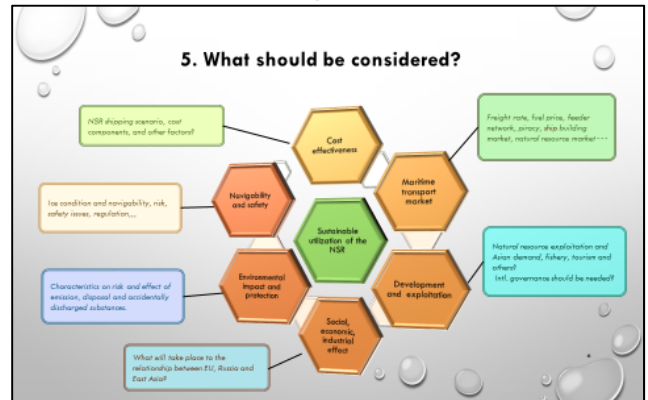


Fig.-6

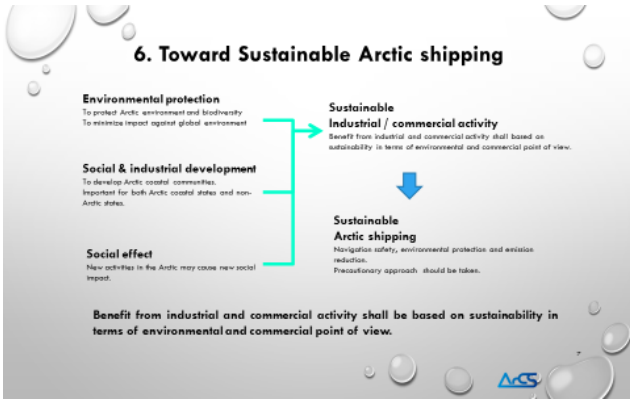


Fig.-7

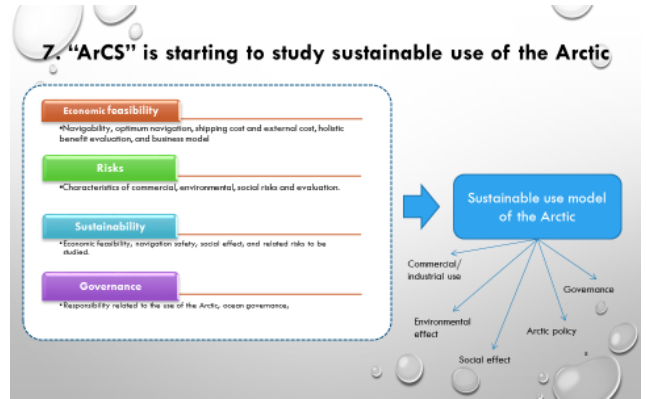


Fig.-8

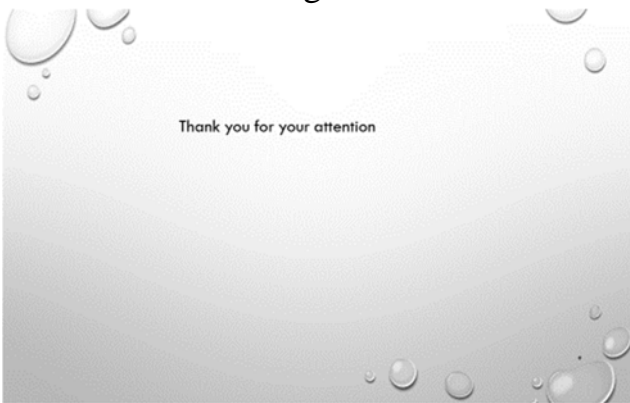


Fig.-9

(10) KIM, Jong-Deog(Justin) (KMI)
Wrap-up Session “Suggestions for the Future NPARC”

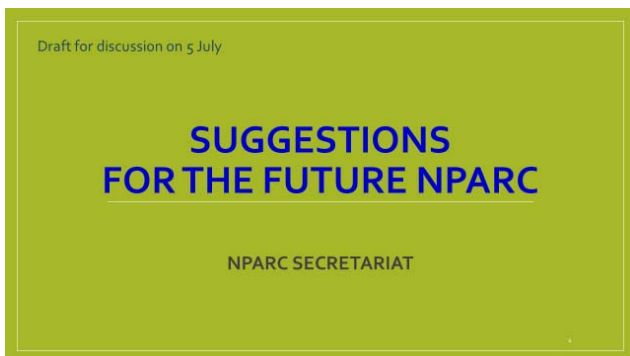


Fig.-1

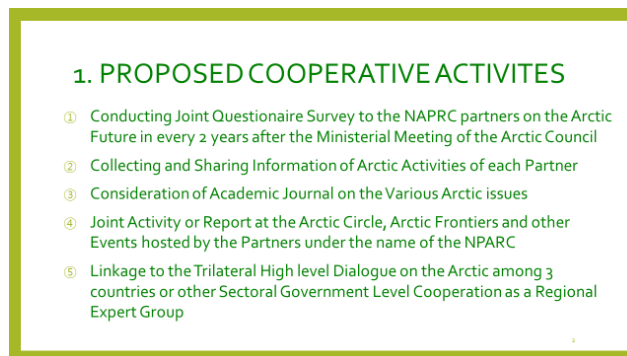


Fig.-2



Fig.-3

7, Photos



Opening Ceremony Opening Address



Hiroshi Saeki (Chairperson of CPC)



Sung Gwi Kim (President of KMI)

Introduction of Participants



Noriaki Kawai (Director General of CPC)

Keynote Speeches



Keynote-1 : KIM, Jong-Deog(Justin)
(KMI)



Keynote-2 :Yasushi Fukamachi (ARC)



Keynote-3 : YANG Jian (SIIS)

Session-2 : China's Activities on Arctic Research



(1) Xu Hua (WTI)



(2) Zhang Yao (SIIS)



(3) Cheng Baozhi (SIIS)

Session 3 : Korean Activities on Arctic Research



(1) Wooik Choi and Seungdo Ra (IRS), (HUFS)



(2) Kang, KukJin (KRISO)



(3) Hyun-Soo Kim (ITC)



(4) Jihoon Jeong (KOPRI)

Session 4 : Sustainable Use of the Arctic



(1) Eiji Sakai (OPRI)



(2) Koh Izumiyama (former NMRI)



(3) Natsuhiko Otsuka (CPC, ARC)

Wrap-up Session



Chair : KIM, Jong-Deog(Justin) (KMI)



Discussion-1



Discussion-2



Discussion-3

Closing Remarks



Ryuichi Kuwajima (OCDI)

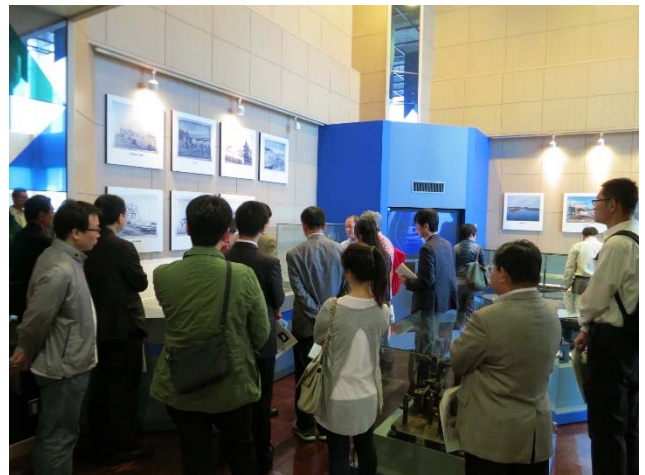
**Social Hour
Fellowship Banquet in Sapporo Beer
Garden**



Excursion on 6th July(wed.)



Otaru port museum -1



Otaru port museum -2