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Activities to Promote Industry-Government-Academia Collaborative Research on the Arctic Region supported by Japan Arctic Research Network Center (J-ARC Net)

Masato TANAKA¹, Natsuhiko OTSUKA¹ and Yasushi FUKAMACHI¹

¹ Arctic Research Center, Hokkaido University, Sapporo, Japan

Abstract

Activities to promote Industry-Government-Academia (I-G-A) collaboration project in Japan Arctic Research Network Center (J-ARC Net) are shown in this report. These activities are consisting of the Arctic region open seminar, I-G-A collaboration planning meeting, I-G-A feasibility study, and promoting researcher nurture supported by planning, coordination and fund of J-ARC Net. And effective disseminating results are aiming to increase Japanese national presence of international Arctic research.

Key words: J-ARC Net, Arctic region, industry, government, collaborative research

INTRODUCTION

J-ARC Net as a center of excellence certified by the Ministry of Education, Culture, Sports, Science and Technology was funded in April 2016 as the first formulated network cooperated by three research centers constituting J-ARC Net conducive to solve issues toward rapid environmental and amplified climatic changes and to promote sustainable utilization for industries in Arctic Region.

J-ARC Net promotes advanced and interdisciplinary collaborative research conducive to understanding environmental-human interactions and creation of new academic fields regarding sustainable utilization and preservation of Arctic region.

For promoting advanced and interdisciplinary collaborative research, J-ARC Net makes the best use of research infrastructures of three organizations to which three centers belong such as research vessels and overseas laboratories, and mediates between research communities, industries and government offices to promote activities conducive to solve problems in Arctic region.

J-ARC Net also nurtures personnel who have broad outlook and can lead international discussion to solve challenges in Arctic region.

J-ARC Net disseminates the results of the above activities effectively and aims to increase Japanese national presence in international Arctic research.

ACTIVITIES

(1) Supporting Research Communities Project (SRC)

a) Challenging Exploratory Interdisciplinary Joint Research (EI): J-ARC Net supports and promotes Challenging Innovative Interdisciplinary Research developed from Meeting for Collaborative Research and Collaborative Promoting Research, conducive to solve problems in Arctic region

b) Joint Promotion Research (PR): J-ARC Net encourages bottom-up joint research for researchers not only in natural sciences but also in humanities,

social and practical sciences and those new to the Arctic region.

c) Joint Research Meeting (RM): J-ARC Net provides meeting opportunities for researchers in various fields to plan research projects for Challenging Innovative interdisciplinary research and collaborative promotion research.

(2) Promotion I-G-A Collaboration Projects (IGA)

a) Arctic Region Open Seminar: J-ARC Net holds the open seminars for personnel in industries and governments to provide the latest information on the Arctic region in natural and social sciences, and to promote new entry to activities to solve challenges in Arctic region, which have been held six times as shown in Table 1.

Table 1. The Arctic Region Open Seminar in FY2016-2021

No.	Date	Subjects	I ^{*5}	G ^{*6}	A ^{*7}
1 st *1	Jan 17 2017	Future Arctic Region, and North Sea Route (NSR)	44	19	24
2 nd *2	Mar 17 2017	Utilization for NSR and its Perspectives	27	5	29
3 rd *1	July 24 2017	Utilization for the Arctic Region to create industries	75	24	27
4 th *2	Dec 14 2017	Trend of the economic development and international governance around the Arctic region	25	14	26
5 th *1	July 20 2018	Progress of the latest Arctic research and the possibility of application to industry and society	21	19	32
6 th *2	Dec 12 2018	Possibilities and challenges for application to industry on the latest Arctic observation and prediction technology	29	2	27
7 th *1	July 24 2019	Changing Arctic environment and its impact on Hokkaido	25	3	41
8 th *2	Dec 12 2019	Current status and prospects of Arctic oil and gas development	19	8	26
9 th *3	Oct 22 2020	Arctic Ocean as East-West Corridor, Sustainable Use and Future"	45	19	49
10 th *4	Feb 8, 2021	Finnish-Japanese Data Center Seminar Sustainability and Regional Developm	13	32	37

11 th *3	Oct 19 2021	Current status, impact and countermeasures of environmental pollution in the Arctic region	23	31	28
12 th *3	Dec 8-9 2021	The development of sustainable cruise industry in the Pacific Arctic: Past developments and future prospects	52	70	130
Total 575			26	94	232

*1: Sapporo, *2: Tokyo, *3: Online, *4: Hybrid, the number of participants from Industries (*5), Governments (*6) and Academia (*7), respectively

Results of survey regarding the Arctic region by participants in the 11th the Arctic Region Open Seminar are shown in Fig. 1, 2, 3, 4 and 5.

【Q1】 Was the seminar useful for you ?

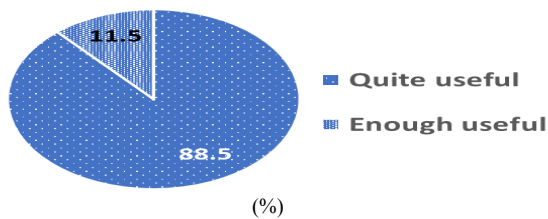


Fig. 1 Usefulness of the Arctic Region Open Seminar

【Q2】 Which fields of natural science in the Arctic region can you expect the possibility of social implementation efforts ?

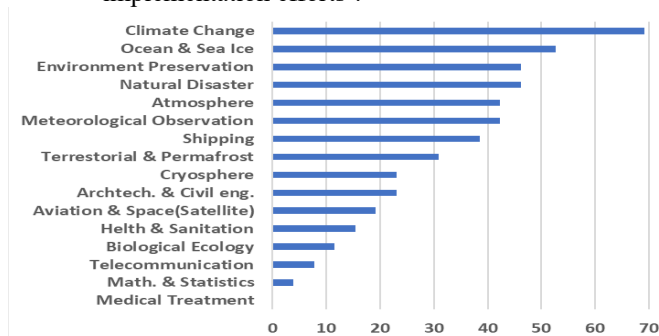


Fig. 2 Expected natural scientific fields in the Arctic region (%)

【Q3】 Which fields of human and social science in the Arctic region can you expect the possibility of social implementation efforts ?

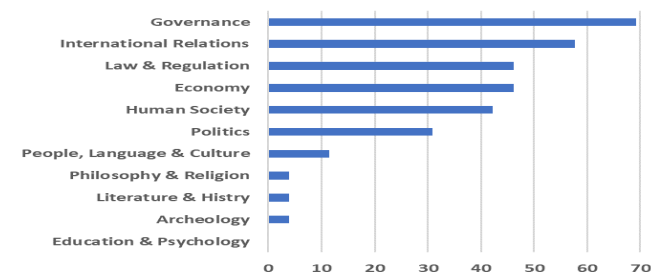


Fig. 3 Expected human and social science fields in the Arctic region (%)

【Q4】 Which Industrial fields in the Arctic region can you expect the possibility of social implementation efforts ? *NSR: North Sea Route

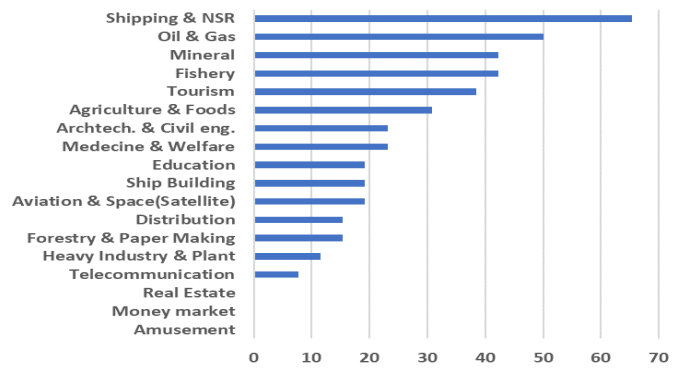


Fig. 4 Expected industrial fields in the Arctic region (%)

【Q5】 What do you expect from this Open Seminar to promote new entry to industrial activities in the Arctic region ?

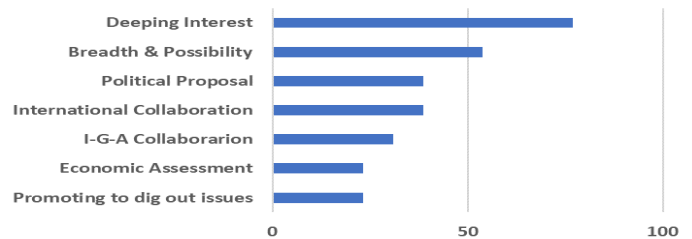


Fig. 5 Expectation to the Arctic Region Open Seminar (%)

b) I-G-A Collaboration Planning Meeting (PM): J-ARC Net provides meeting opportunities for personnel in industries and governments to discuss problems to be solved by I-G-A collaboration and to plan collaborative research.

c) I-G-A Collaboration Feasibility Study (FS): For personnel in research, industries and governments, J-ARC Net promotes feasibility studies to carry out problem-solving joint research with I-G-A collaboration.

(3) Collaborative research in SRC (EI, PR and RM) and IGA (PM and FS)

Results of acceptances from public applicable proposals for promoting advanced and interdisciplinary collaborative research in SRC and IGA from FY2016 to FY2021 are shown in Fig. 6 to Fig. 8.

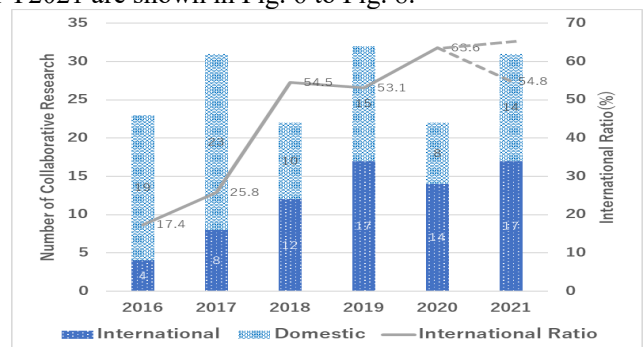


Fig.6 Trend of the number of collaborative research projects (The data of International Ratio for FY2021 is estimated.)

Figure 6 shows the change in the number of joint research proposals. In FY2021, a total of 31 research projects were accepted. The number of international joint research projects has been increasing year by year, and almost half of the last four years have been international joint research projects.

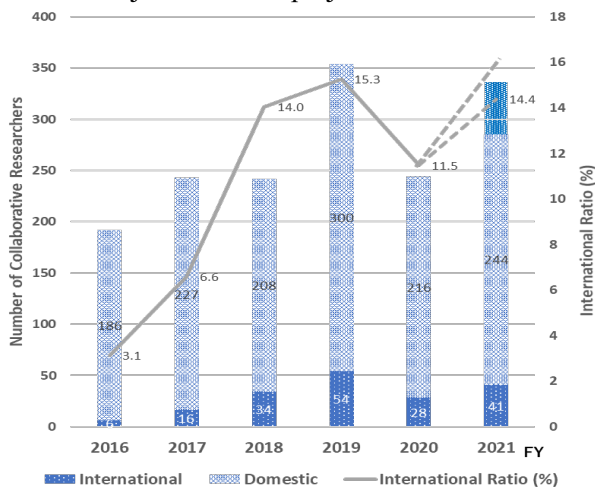


Fig.7 Trend of the number of collaborative researchers (The data of International Ratio for FY2021 is estimated.)

The number and ratio of overseas researchers are increasing year by year as shown in Fig.7. Fig.8 shows the number of interdisciplinary joint research accounts for almost 80% of the total.

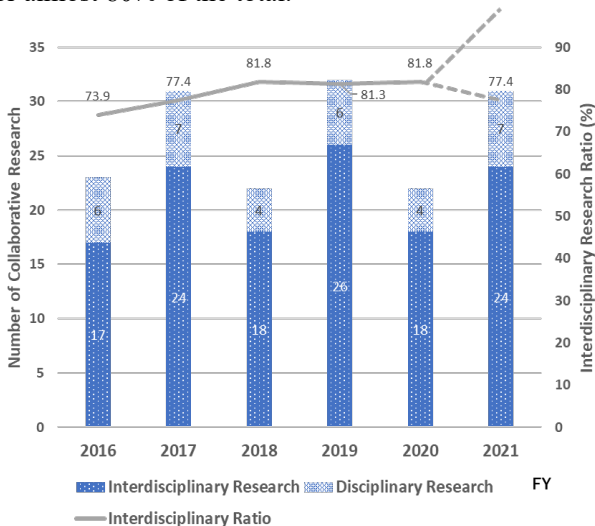


Fig.8 Trend of the number of interdisciplinary research Themes (The data of Interdisciplinary Ratio for FY2021 is estimated.)

(※Interdisciplinary: collaboration of two or three of Human & Social Science, Natural Science and Engineering)

(4) IGA research Projects in FY2019

Research projects of IGA in FY2019 are shown in Table 2. Eleven social implementation collaborative research related to I-G-A collaboration are progressing at the present with 134 researchers as the total number.

Table 2. Research Projects of I-G-A in FY2021

Fields	Research Subjects	Researchers
Observation	Meteorological profiling using an inexpensive Unmanned Aircraft Systems	7
	Pack ice observations by UAV and Sentinel-2 Satellite	5
	Zooplankton community in coastal water around Mombetsu during sea-ice season	6
	Consequences of wildfires in boreal forests underlain by ice-rich permafrost near Batagai, NE Siberia	11
	Study on Arctic marine plastic pollution	14
Engineering	Needs for technical research on the Arctic region / Seeds analysis and matching study meeting report	20
	Evaluation of Ship Resistance in Ice Regime using Ice Chart	18
Sustainable Utilization	Trans-Arctic submarine fiber-optic communications cables: Recent developments and future prospects	8
	Research exchange between Japan and Finland on data centers in the cold climate region	10
	Prospects for sustainable development of the cruise industry in the Pacific Arctic: Outcomes of the Japan-Russia online workshop held on 8-9 December 2021	11
	Breaking the ice as a tourist experience: local initiatives facing global challenges	18
	Arctic Tourism for Community Resilience	12
Total: 139 (I:33, G:37, A:73) (*including 18 from overseas)		139*

(3) Promoting researcher nurture programs

For not only personnel in research but also in industries and governments, J-ARC Net provides courses to nurture personnel who can contribute to solve challenges in the Arctic region as shown in Table 3. And the field course, “Winter School” will be held in the Okhotsk area instead of the usual Yakutsk due to the influence of the new corona pandemic this year as shown in Table 4.

Table 3. Nurturing courses for the Arctic region No.1

Lectures for Introduction of Arctic region from Nov.24 to 26, 2021 held online	
Participants from relatives I-G-A:39 auditors including 13 females in total involving I:5, G:10, A:24 including 18 graduate and undergraduate students	
Program	
1. Opening, Guidance and Self-introduction, 2. Lectures; (1) Geography & History, (2) Atmosphere, (3) Snow and ice, (4) Ocean (5) Ocean Ecosystem, (6) Terrestrial Ecosystem, (7) North Sea Routes, (8) Resources Development, (9) Human beings and Society, (10) Governance, 3. Social Gathering, 4. Presentation & Discussion, 5. Closing	

Table 4. Nurturing courses for the Arctic region No.2
“Winter School as Field courses on” Arctic Nature and

People's Life Learned from Winter in Okhotsk"

from Feb 14 to 18, 2022 at Okhotsk Sea region, Japan

For entry, public applicable proposal started on the late of Nov. and were accepted on the mid of Jan.

Participants will be planned around 20.

Program (tentative)

1. Opening & Orientation, 2. Observation of snow cover, low temperature room (-50 °C) and Ice core, 3. Sea ice and ecology of the Okhotsk Sea, 4. Drift Ice Observation at Okhotsk Sea, 5. Icebreaker sightseeing ship "Aurora" embarkation and sea ice prediction, 7. Lectures (1) Shiretoko World Heritage Sites, Wildlife Conservation and Management, Relationships with People, (2) Remote sensing observation of terrestrial ecosystem, (3) Permafrost ecosystems under changing climate, and (4) Life in the north: culture and history of Sakha Republic, Russia (from Russia online), (5) Opinion exchange and presentation etc.

(4) Disseminating results

- a) international symposium: J-ARC Net holds international symposiums, for example International Symposium on the Okhotsk Sea & Polar Oceans to disseminate results of activities and invites experts to the symposium for discussion of our future activities.
- b) Website: J-ARC Net provides a website to disseminate results of activities and J-ARC Net information opens to the public by mail magazine etc.
- (5) Prospective effects
 - a) Advance of interdisciplinary research conducive to solve problems in Arctic region and creation of innovative academic fields by interdisciplinary research.
 - b) Adoption of new viewpoints and technologies through interdisciplinary collaboration and creation of innovations.
 - c) Promotion of international collaboration through advanced and interdisciplinary researches, and expansion of industry-academic-government Arctic research community.
 - d) Creation of new industries and markets in Arctic region
 - e) Supply of personnel with broad outlook who can contribute solving problems in Arctic region.
 - f) Contribution to increase Japanese presence internationally by solving problems in Arctic region.

CONCLUSIONS

J-ARC Net has started entry of collaborative research for FY2020 by Dec.21 in 2020. Your participation to J-ARC Net Projects as below aside from Open Seminar will be very appreciated.

For details: <https://j-arcnet.arc.hokudai.ac.jp/news/22137/>

I. Researcher's Community Support Projects

- (1) Innovative interdisciplinary collaborative research
- (2) Collaborative promoting research
- (3) Meeting for collaborative research

II. I-G-A Collaboration Support Projects

- (1) Arctic region open seminar
- (2) Feasibility study

(3) Planning meeting for setting issues

III. Researchers Nurture programs

J-ARC Net also will prepare to entry Researchers Nurture program for FY2020 on website around mid of Dec.,2020, although that of collection in FY2019 was closed.

j-arcnet@arc.hokudai.ac.jp

<http://j-arcnet.arc.hokudai.ac.jp/>

<http://www.arc.hokudai.ac.jp>

Tel: +81-11-706-9625 Fax: +81-11-706-9623

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- J-ARC Net (Japan Arctic Research Network Center) was funded in 2016 and organized by Arctic Research Center in Hokkaido University, Arctic Environment Research Center in National Institute Polar Research and Institute Arctic Climate and Environment Research in Japan Agency for Marine-Earth Science and Technology.
<http://j-arcnet.arc.hokudai.ac.jp/organization/>

Summary in Japanese

「北極域をめぐる産学官連携共同研究活動」
～北極域研究共同推進拠点産学官連携事業～

田中雅人¹, 大塚夏彦¹, 深町康¹

¹北海道大学北極域研究センター

2016年度より文科省共同利用共同研究拠点に認定された北極域研究共同推進拠点において、北極域の持続可能な利用と保全に関する新たな学術領域の創成に向けて、国際・異分野共同研究、人材育成プログラム、国際シンポジウム等を推進中。その中で特に2021年度産学官連携支援事業として、北極域オープンセミナー、課題設定集会、フィージビリティ等の共同研究による課題解決、課題解決型人材育成などの活動を中心に報告する。

Correspondence to: Masato TANAKA,
mtanaka@arc.hokudai.ac.jp

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