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

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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, industry, government, collaborative research, Arctic region

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 conductive 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

a) Challenging Exploratory Interdisciplinary Joint Research: 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: 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: 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

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 2016-2018fy

No.	Dates	Subjects	I[*3]	G[*4]	A[*5]
1st *1	Jan 17 2017	Future Arctic Region, and North Sea Route (NSR)	44	19	24
2nd *2	Mar 17 2017	Utilization for NSR and its Perspectives	24	5	29
3rd *1	July 24 2017	Utilization for the Arctic Region to create industries	75	24	27
4th *2	Dec 14 2017	Trend of the economic development and international governance around the Arctic region	25	14	26
5th *1	July 20 2018	Progress of the latest Arctic research and the possibility of application to industry and society	21	19	32
6th *2	Dec 12 2018	Possibilities and challenges of application to industry on the latest Arctic observation and prediction technology	29	2	27
		Total 469	**221**	**83**	**165**

*1: Sapporo, *2:Tokyo, *3,*4 and *5:the number of participants from **I**ndustries(*3), **G**overnments(*4) and **A**cademia(*5), respectively

Results of survey regarding the Arctic region by participants in the fifth and sixth The Arctic Region Open Seminar shown in Fig. 1, 2, 3, 4 and 5.

【Q1】Was the seminar useful for you ?

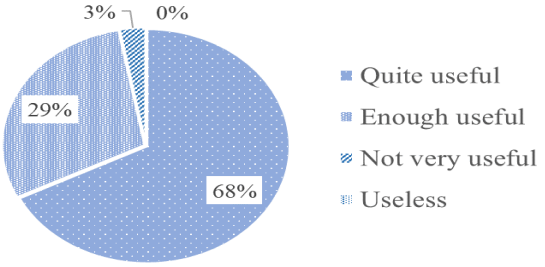

Fig. 1 Usefulness of the Arctic Region Open Seminar

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

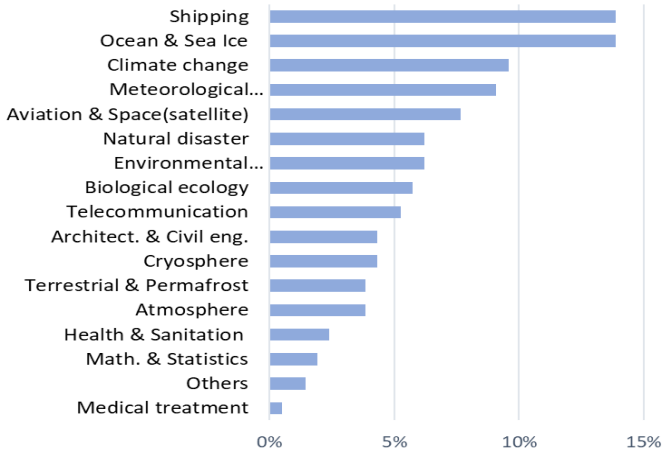

Fig. 2 Expected natural scientific fields in the Arctic region.

【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

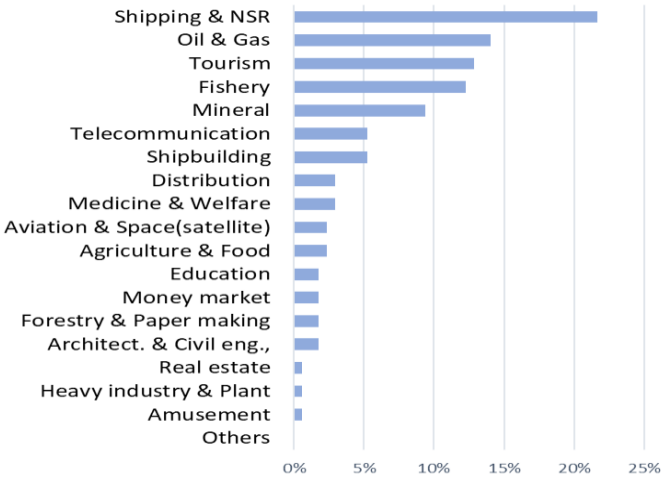

Fig. 4 Expected industrial fields in the Arctic region

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

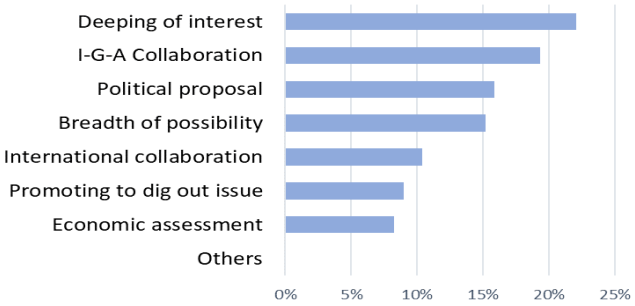

Fig. 5 Expectation to the Arctic Region Open Seminar

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.

Results of acceptances from public applicable proposals for promoting advanced and interdisciplinary collaborative research are shown in Table 2.

Table 2. No. of proposal accepted from proposals for promoting advanced and interdisciplinary collaborative research in FY2016 to FY2018

Activities	Categories	Subsidy (x¥1000)	Term (y)	FY	Accep-tances
Supporting Research	Challenging Exploratory	2500	Max2	2016	1
				2017	0

Communi-ties Project	Interdisciplinary Joint Research			2018	3
	Joint Promotion Research	700	1	2016	9
				2017	16
				2018	8
	Joint Research Meeting	500	1	2016	8
				2017	7
				2018	5
			Subtotal		57
Promoting **I-G-A** Collabora-tion Projects	Collaboration Feasibility Study (**FS**)	2500	Max2	2016	3
				2017	1
				2018	3
	Collaboration Planning Meeting (**PM**)	500	1	2016	2
				2017	3
				2018	2
			Subtotal		14
			Total 71	**2016**	**23**
				2017	**27**
				2018	**21**

Fourteen I-G-A collaborative research involving a total of 107 researchers were accepted in FY2016, FY2017 and FY2018.

Research Subjects of Promoting I-G-A Collaboration Projects in FY2018 are shown in Table 3. Six I-G-A collaborative research are progressing at the present with 65 researchers as the total number.

Table 3. Research Subjects of in **I-G-A** Collaboration Support Projects in FY2018

Cate-gories	Fields	Research Subjects	Resear-chers
FS	NSR	Practical examination and analysis of utilization of Northern Sea Route (NSR) in Hokkaido	I:2 G:2 A:4
	NSR	The feasibility study for Ice Navigation Support System for the Northern Sea Route (NSR)	I:5 G:0 A:15(incl. Russian:2)
	Engi-neering	Arctic Technology & Research Forum to consolidate opinions from industries	I:5 G:0 A:6
	Perma-frost	Assessing and mediating damage on infrastructure and changes in ground surface due to permafrost thaw	I:1 G:2 A:7(incl. Russian:3)
PM	Perma-frost	An Indispensable Condition to Secure the Continuity of Ice and Frozen Soil Engineers in Japan	I:3 G:0 A:4
	Oil Spill	Research on Arctic Oil Spill Response Technology	I:5 G:0 A:4
Total: 65			**I:21, G:4, A:40**

(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 4. And the study courses include lectures and field courses utilized such as Japan-Russia Joint Research Laboratory established by Hokkaido University and North-Eastern Federal University at Yakutsk as shown in Table 5.

Table 4. Nurturing courses for the Arctic region (1)

Lectures for Introduction of Arctic region in FY2018

Nov.21 to 22, 2018 in Sapporo and Tokyo

Participants from relatives I-G-A:33 auditors in total involving I:13, G:3, A:16 and other:1

Program

1. Opening, Guidance and Self-introduction
2. Lectures

(1) Geography & History, (2) Atmosphere, (3) Glacier & Ice Bed, (4) Ocean (5) Ocean Ecosystem, (6) Terrestrial Ecosystem, (7) North Sea Routes, (8) Resources Development, (9) Human beings and Society, (10) Governance and (11) Data Science

2. Social Gathering
3. Presentation & Discussion
4. Closing

Table 5. Nurturing courses for the Arctic region (2)

Winter School as Field courses on "Environment and Innovation of the North" in FY2017

on Feb.23-Mar.4, 2018 at Yakutsk via Vladivostok in Russia

Organized by J-ARC Net, HU-NEFU-IBPC* Joint Research Lab

* HU: Hokkaido University, NEFU: North Eastern Federal University and IBPC: Institute for Biological Problems of Cryolithozone

Participants; Japan:I;0,G:2(one from central government agency, other from Municipality of Hokkaido), A:8 (one research fellow in the university, two PhD students, four graduate school students, one under graduate school student)
Russia: six graduate school students

Lecturers; Japan:2, Russia:7

Program

(a)City Tour in the Far East Russia
(b)Excursion for Spasskaya Pad Experimental Forest
(c)Introductory Seminar and Natural History
-Lectures on Permafrost & its Ecosystems and Satellite ecology
-Self-introduction for Japanese and Russian participants
(d)Economy and Industry
-Lecture on Economy of Sakha
-Tour at Arctic Innovation Center, Greenhouse Project Site and Diamond Museum
(e)Life in the North, Education
-Lectures on Life in the North and Ecology and Education
-Excursion for Cities and Suburbs in Cold Environment, River ice road, and Fish market
(f)History and culture
-Lecture on History of Sakha
-Dance performance
-Tour & Excursion at Yakutsk State Museum of Art, Culture or History Museum, Russian Church and Mammoth Museum
(g)Participant Forum
-"Environment and Innovation of the North" Presentation and Discussion by participants
-Lecture on Policy and Governance

-City tour & Excursion of Lenin avenue, city center of Yakutsk for Cultural activities, and farewell party
(h)City Tour in Yakutsk

Winter School as Field courses on" Environment and Innovation of the North" in FY2018
on Feb.21 to Mar. 2, 2019 at Yakutsk via Vladivostok in Russia

Organized by J-ARC Net, HU-NEFU-IBPC* Joint Research Lab and Human Resource Development Platform for Japan-Russian Economic Cooperation and Personnel Exchange (HaRP)

For entry, public applicable proposal started on the late of Nov. and were adopted on the mid of Dec.
Participants will be I;1, G:1, A:4 from Japan and, five graduate school students from Russia. Lecturers will be three from Japan and seven from Russia.

Program

(a) City Ture in the Far East Russia
(b) Excursion around Natural Environment
(c) Introductory Seminar and Natural History
(d) Lecture and Tour
ⅰ) Economy and Industry
ⅱ) Life and the North and Education
ⅲ) History and Culture
ⅳ) Participant Forum and Excursion

(4) Disseminating results

a) International symposium: J-ARC Net holds international symposiums 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.

(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 FY2018. Your participation to J-ARC Net Projects as below will be very appreciated.

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 FY2019 on website around mid of Dec.,2020, although that of collection in FY2018 was closed.

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REFERENCES

Masato TANAKA and Sei-ichi SAITO (2018). Activities to Promote Industry-Government-Academia Collaborative Research on the Arctic Region, Proc., 33rd Int'l. Symposium on Okhotsk Sea and Polar Oceans:109-112

Three centers and three organizations to which three centers belong constituting J-ARC Net;
J-ARC Net is constituted 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紹介」
～北極域研究共同推進拠点産学官連携事業～

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平成 28 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共同研究、人材育成プログラムを推進中。その中で特に平成 30 年度を中心に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、フィージビリスタデ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について紹介した。