



7th International Meeting of the Arctic Council Member States,
Observer States and Foreign Scientific Community

Arctic Monitoring of KOREA

Yoo Kyung Lee

Korea Polar Research Institute



CONTENTS

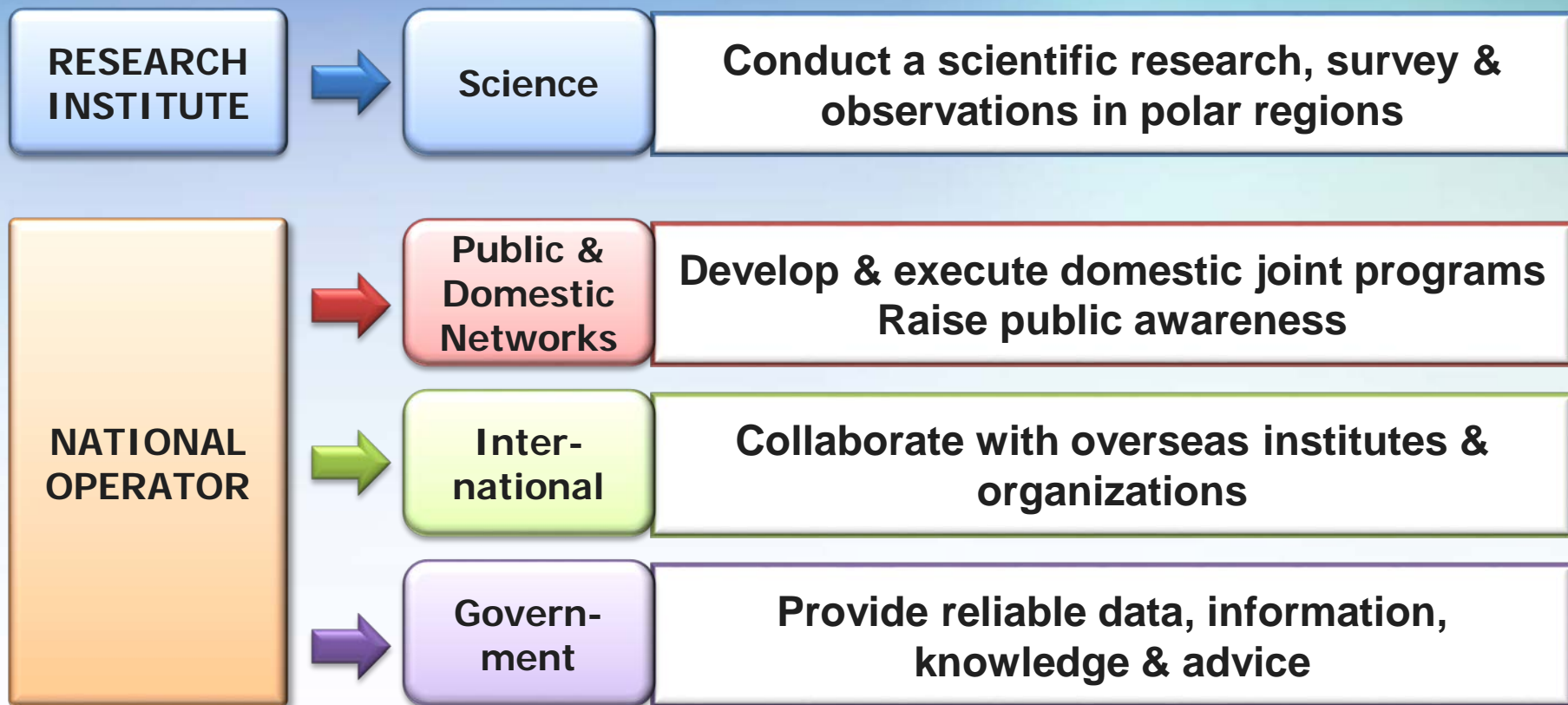
The background of the slide is a wide-angle photograph of an Arctic landscape. The foreground and middle ground are dominated by a vast, flat expanse of snow and ice, with numerous footprints and tracks visible. In the distance, a large blue and white icebreaker ship is visible on the horizon under a cloudy sky. The overall color palette is cool, with various shades of blue and white.

1 Arctic Monitoring Activities of KOPRI

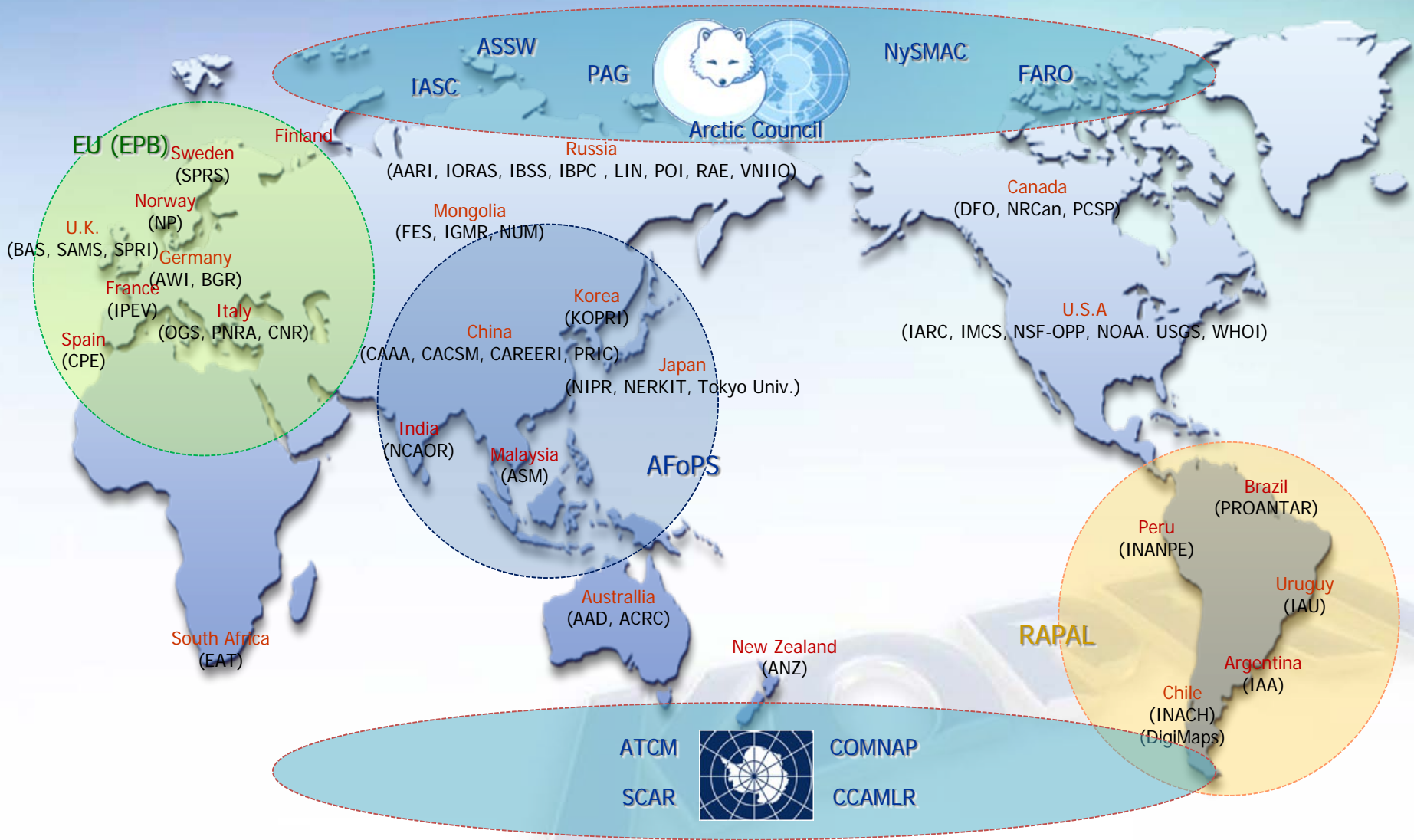
2 Research Collaboration with Russia

3 Arctic Outreach Activities

The Functions of KOPRI



International Cooperation Networks



KOPRI AT A GLANCE

An aerial photograph of the KOPRI campus. The image shows several modern buildings, including a prominent one with a blue and white patterned facade. There are large parking lots with many cars, and a complex road network with multiple lanes and roundabouts. The surrounding area includes some greenery and a body of water in the distance.

- ❖ ~ 370 employed
- ❖ ~ 190 regular positions
- ❖ Budget ~90 million USD

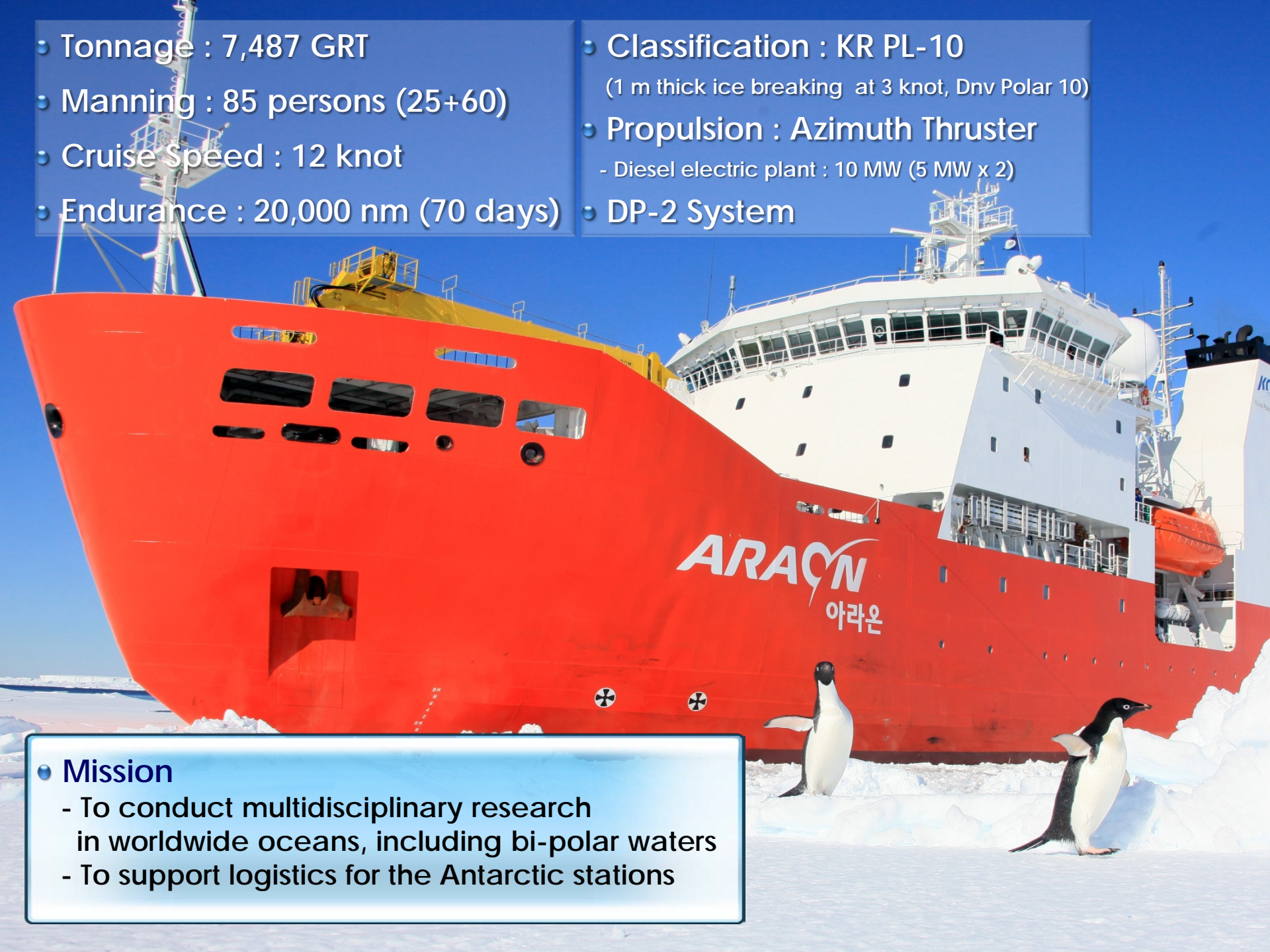


IBRV Araon

- Length: 111 m
- Breadth: 19 m
- Speed: 12 knots
- Gross tonnage: 7,487 ton
- Complement: 25 crews + 60 scientists

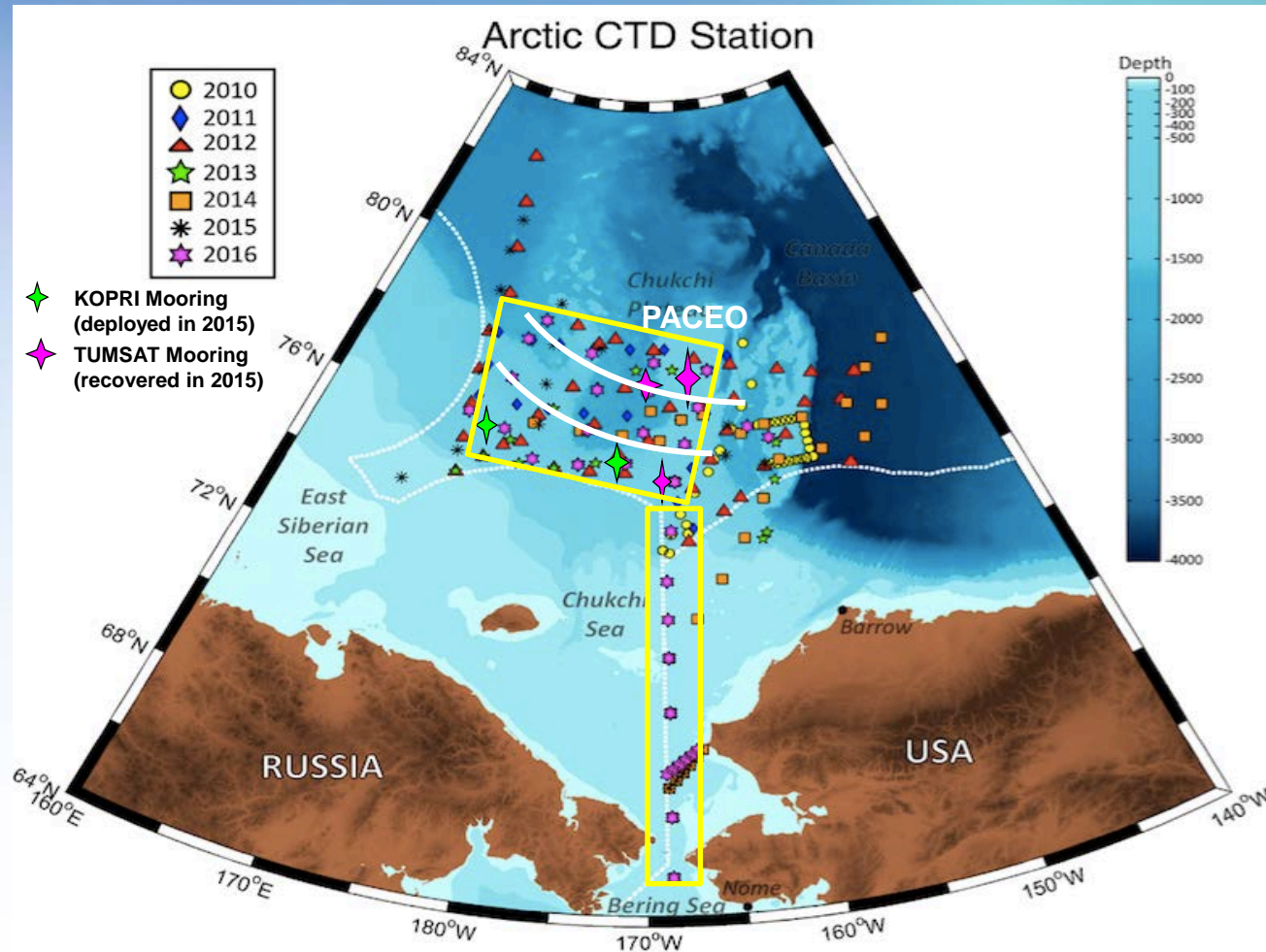


- Tonnage : 7,487 GRT
- Manning : 85 persons (25+60)
- Cruise Speed : 12 knot
- Endurance : 20,000 nm (70 days)
- Classification : KR PL-10
(1 m thick ice breaking at 3 knot, Dnv Polar 10)
- Propulsion : Azimuth Thruster
- Diesel electric plant : 10 MW (5 MW x 2)
- DP-2 System



- **Mission**
 - To conduct multidisciplinary research in worldwide oceans, including bi-polar waters
 - To support logistics for the Antarctic stations

Arctic Cruises of IBRV ARAON (2010~2017)



	2010	2011	2012	2013	2014	2015	2016	2017
1 ST	38	18	44	16	32	42	34	46
2 ND	-	33	48	36	51	61	38	49
Period	7/19~8/9	8/3~8/16	8/3~9/6	8/23~9/25	8/1~9/15	8/3-9/5	8/7-9/8	8/9-9/18

2016 Arctic survey



2016 ARAON ARCTIC CRUISE ARA07B <5. AUG. ~ 21. AUG.>



PI: Sung Ho Kang (shkang@kopri.re.kr)



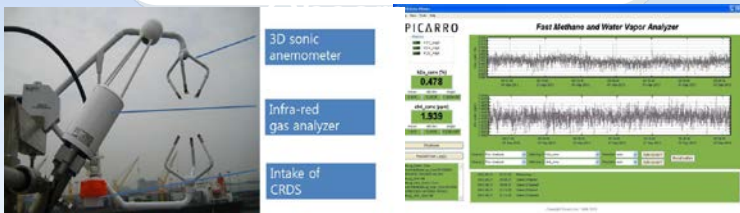
Total 7 countries, 84 participants



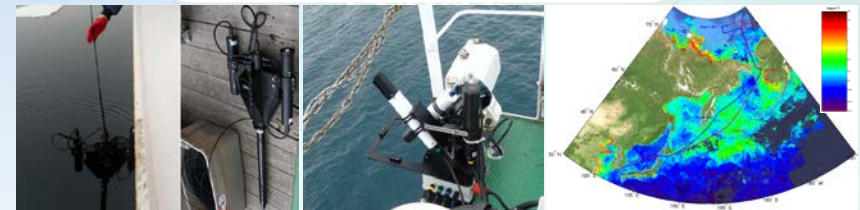
Arctic Ocean Research

Multidisciplinary studies to monitor environmental changes in the Arctic Ocean and related systems

Atmospheric



Satellite Remote



CO₂ system in water



Microbes/Plankton



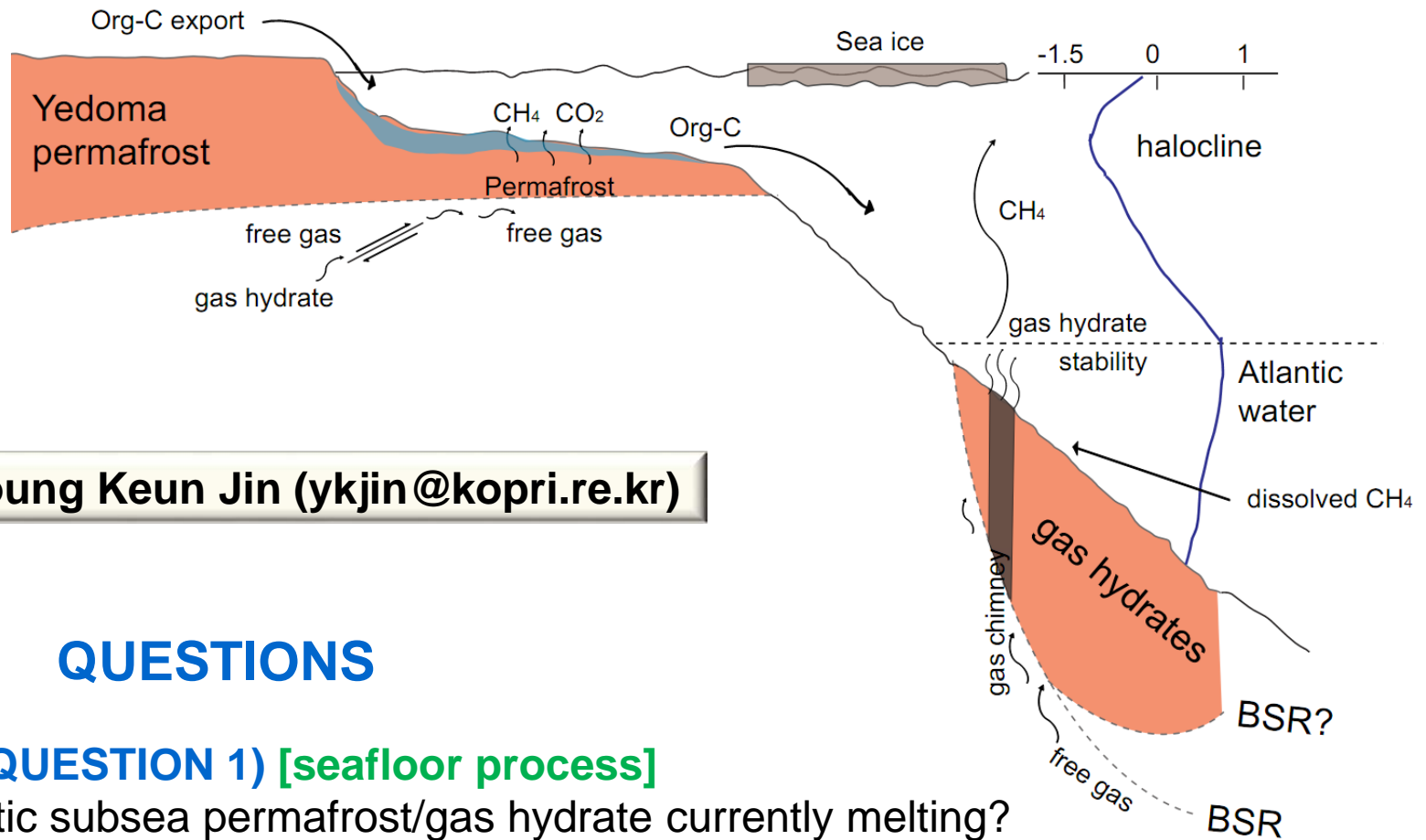
Hydrographic Survey



2016 Arctic Marine Geoscience Expedition (AMAGE)

August 21 - September 10





PI: Young Keun Jin (ykjin@kopri.re.kr)

QUESTIONS

KEY QUESTION 1) [seafloor process]

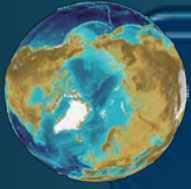
Is Arctic subsea permafrost/gas hydrate currently melting?

KEY QUESTION 2) [methane release]

Is massive methane release really occurring from the Arctic Shelves?

KEY QUESTION 3) ['time bomb' of global warming]

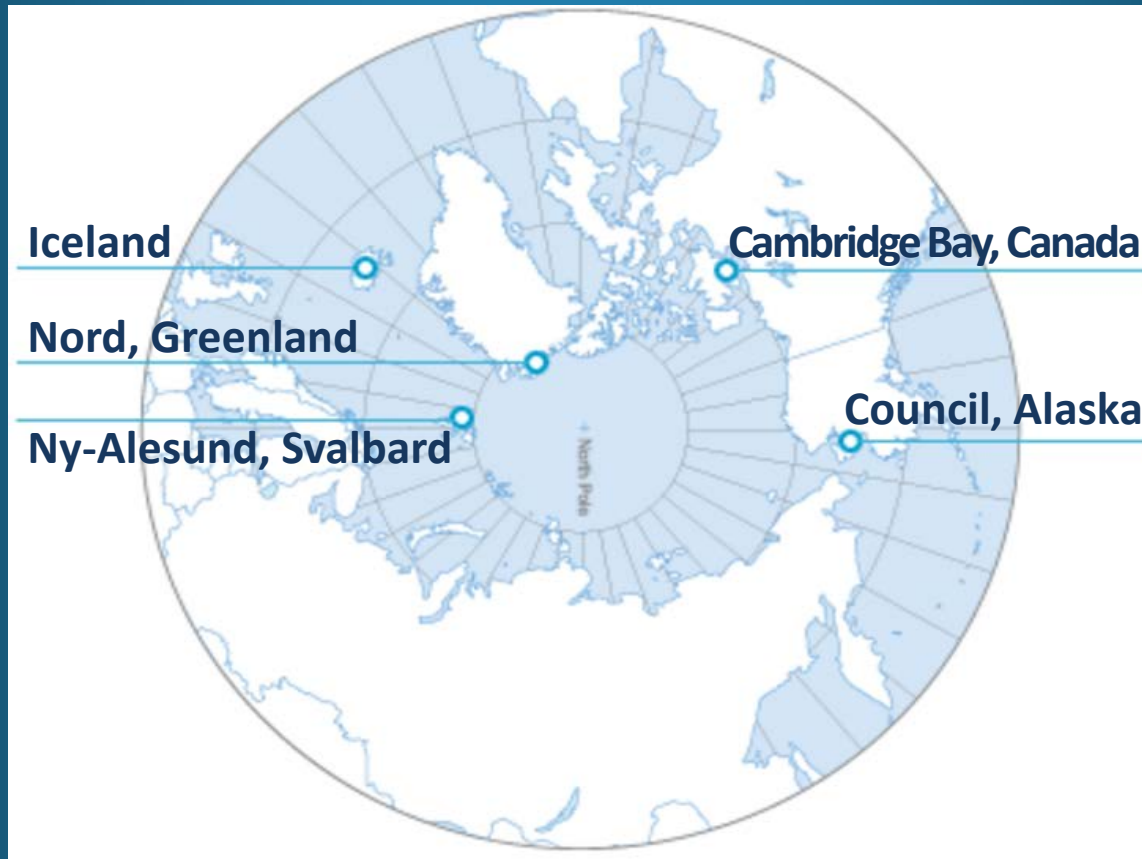
Can methane release in the Arctic Shelves cause the rapid global warming?



Circum-Arctic Permafrost Environmental Change monitoring (CAPEC)

1st : 2011. 6 ~ 2016. 6

2nd : 2016. 5 ~ 2020.12



Circum-Arctic Permafrost Environmental Change monitoring (CAPEC)

● Purpose

- Multidisciplinary studies to monitor ongoing environmental changes in Circum-Arctic permafrost

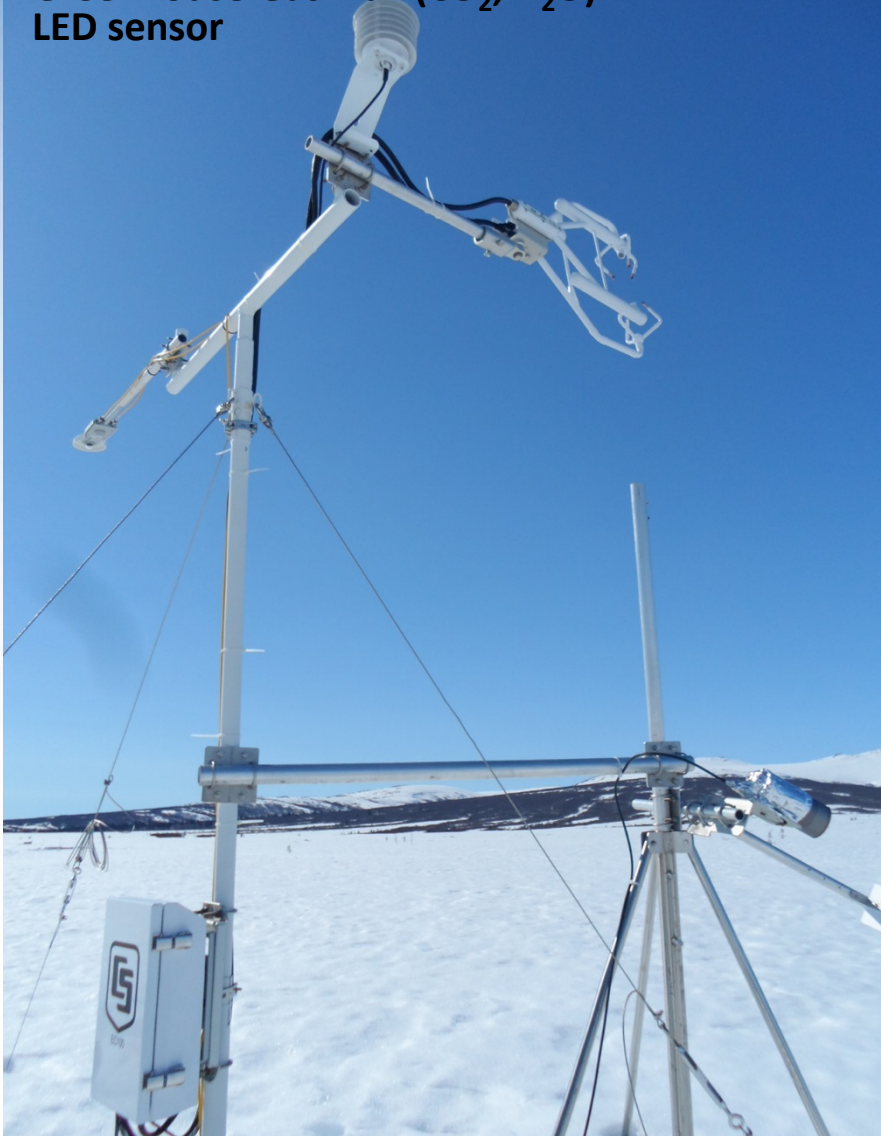
● **Study area:** Council in Alaska, Cambridge Bay in Canada, Ny-Alesund in Svalbard, Nord in Greenland, Stórhöfð in Iceland, **Baranov in Russia**

● **PI:** Dr. Bang Yong Lee (bylee@kopri.re.kr)



Atmospheric Observation in Council, Alaska

Greenhouse Gas Flux (CO_2 , H_2O)
LED sensor



Net CO_2 Exchange Measurements



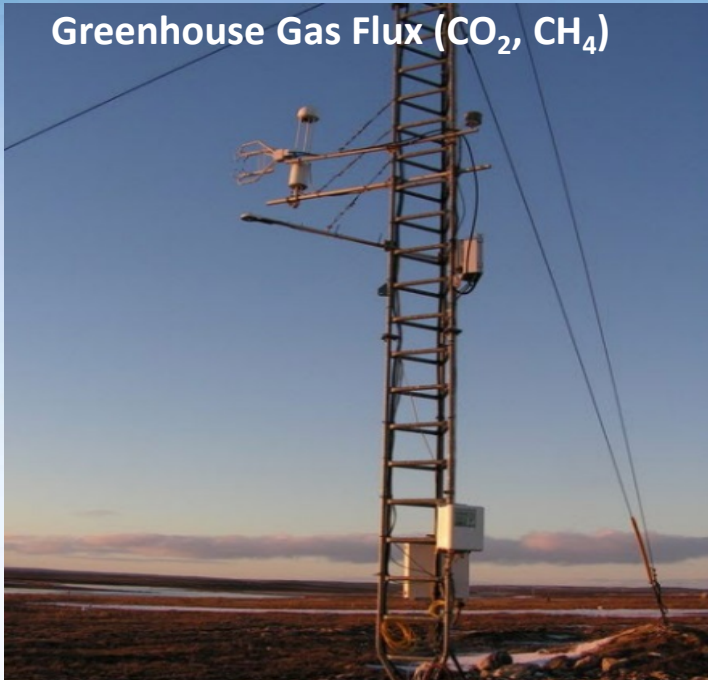
A snow-fence and two OTCs were installed.



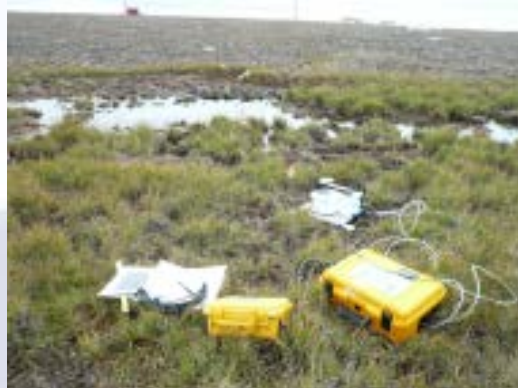
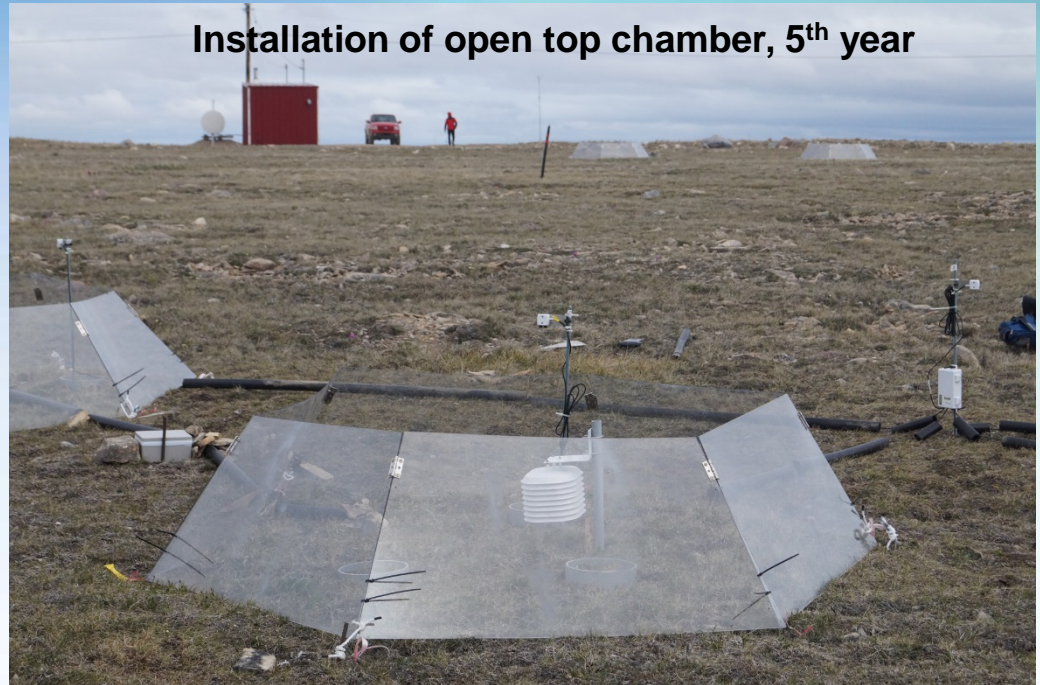
Under the research permission of IARC, UAF

Monitoring Activities in Cambridge Bay

Greenhouse Gas Flux (CO_2 , CH_4)



Installation of open top chamber, 5th year



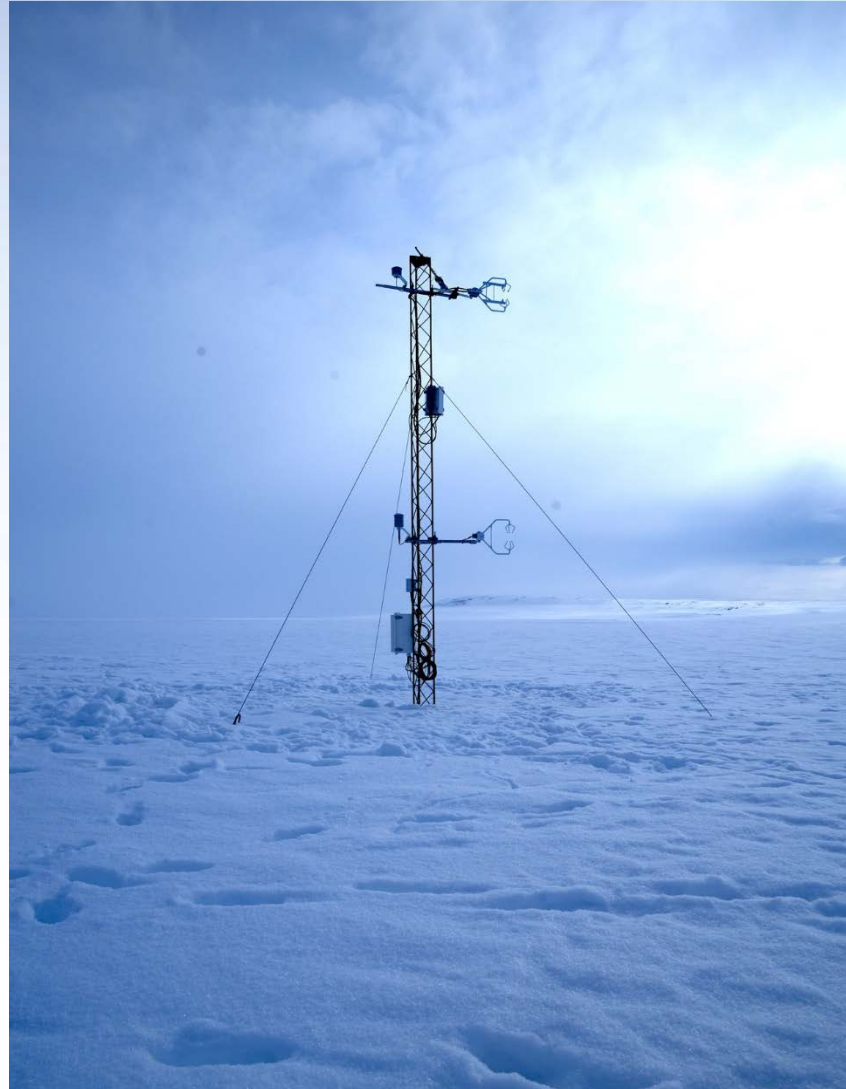
Monitoring Activities in Iceland

DMS measurement system installed in the Storhofdi observatory



Atmospheric Observation in Nord, Greenland

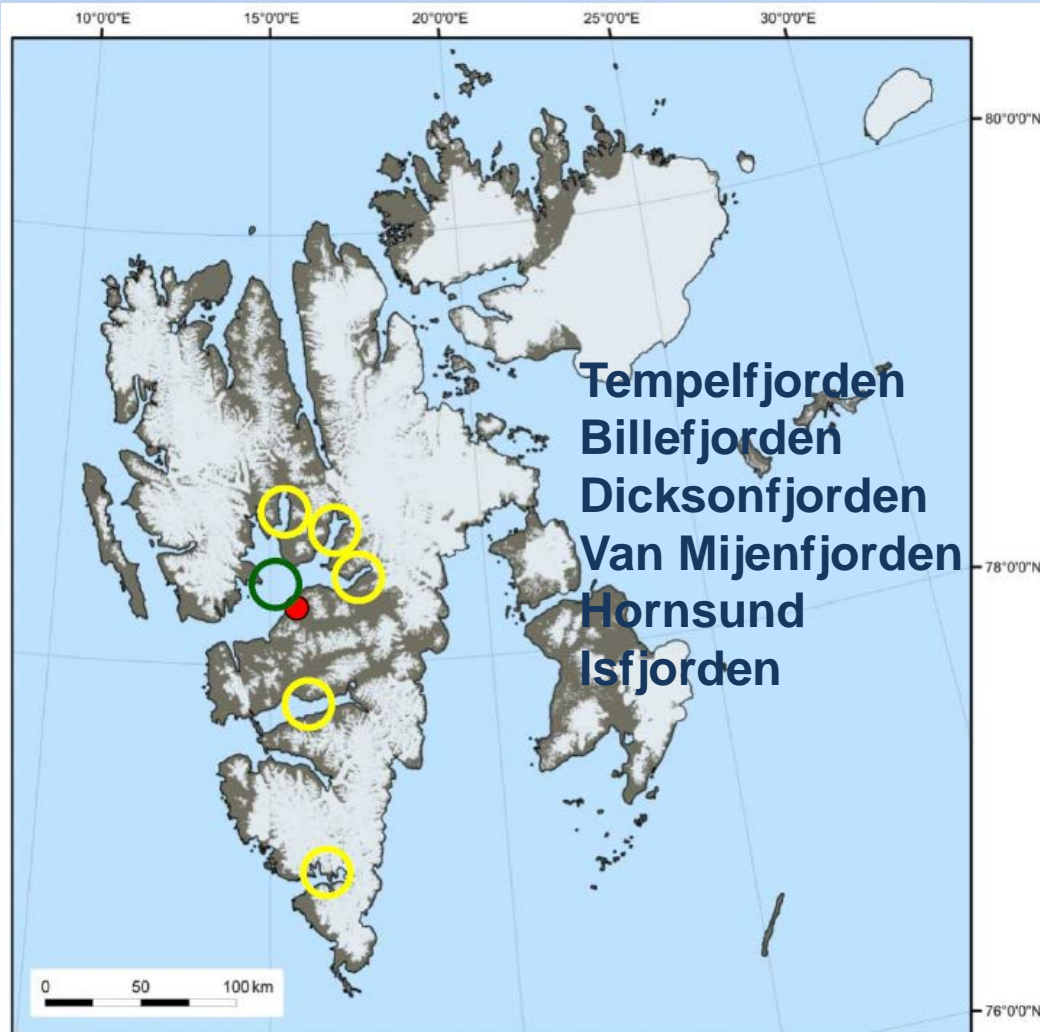
Eddy-covariance system installed on Villum Research Station



2016 RV Helmer Hanssen Svalbard Fjorden Cruise

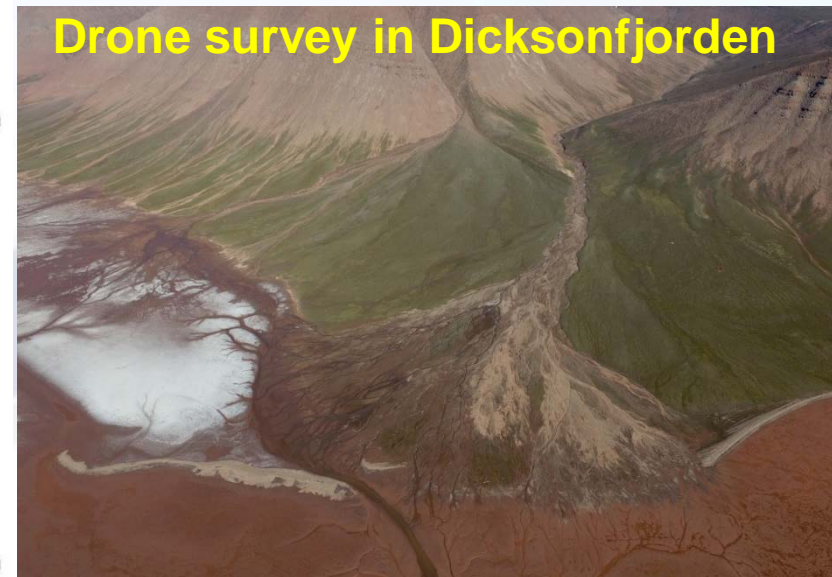
PI: Seung Il Nam (sinam@kopri.re.kr)

- Reconstructing paleoenvironmental changes and glacial history of Svalbard fjords since the last glacial maximum



- Conducted as following:

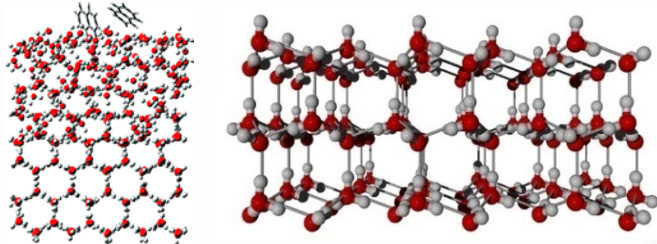
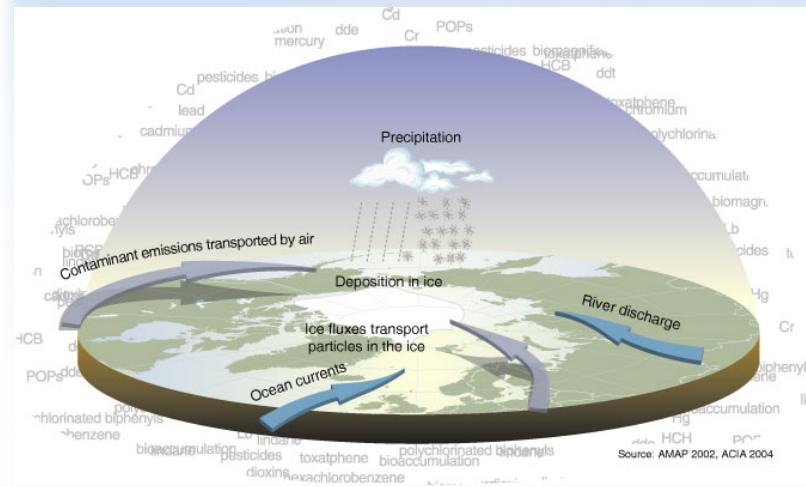
- 15 CTDs
- 11 plankton nets
- 11 box cores
- 16 gravity cores
- ~120 chirp profiles



Arctic Pollutants Research collaboration with Norway

PI: Kitae Kim (ktkim@kopri.re.kr)

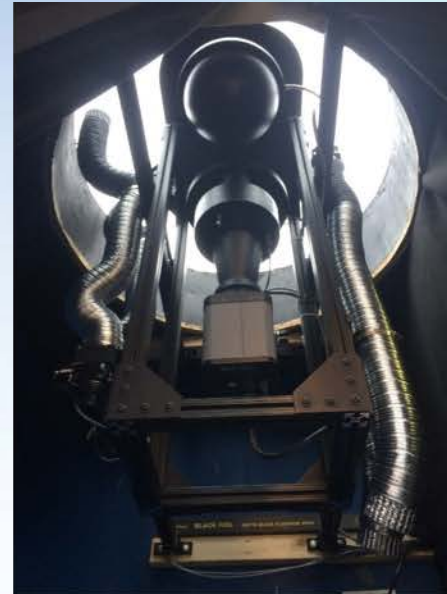
Goals : Studies on the chemical fate of Arctic pollutants trapped in various ice media and monitoring of new contaminants in Kongsfjord using NTSA(Non Target Screening Analysis)



**Chemical fate of pollutants trapped in various ice media?
What kind of pollutants are in Kongs Fjord?**

FPI instrument installed in Kiruna, Sweden

PI: Geonhwa Jee (ghjee@kopri.re.kr)



Data Management



About KPDC ▾ Metadata ▾ PAMC ▾ KVH ▾ AntaGen ▾ KoreaMet ▾ IceCore ▾ Sedicore ▾ Rock&Fossil ▾ Live ▾

Korea Polar Data Center

scientific observations and results from Antarctica shall be exchanged and made freely available.

Antarctic Treaty III.1.c

Find Data Sets by Science Keywords



Agriculture (6)

Agricultural Aquatic Sciences, Feed Products, Agricultural Chemicals ...



Atmosphere (271)

Aerosols, Air Quality, Atmospheric Temperature, Atmospheric Wind, Altitude ...



Biological Classification (57)

Animals/Invertebrates, Fungi, Animals/Vertebrates, Plants ...



Land Surface (58)

Erosion/Sedimentation, Frozen Ground, Soils, Geomorphology ...



Oceans (322)

Aquatic Sciences, Ocean Optics, Bathymetry/Seafloor Topography ...



Paleoclimate (18)

Ice Core Records, Ocean/Lake Records, Land Records ...

Recently Submitted Metadata

Hydroacoustic data in Terra Nova Bay, 2016

[KPDC_2017_0012]

Collaborating with NOAA, 3 Autonomous Underwater Hydrophones(AUH) were deployed in Southern Terra Nova Bay on 10 Decembe ...

on Apr 27, 2017

NIWA oceanographic mooring data in the Drygalski Ice Tongue North 2016

[KPDC_2017_0011]

Collaborating with NIWA, an oceanographic mooring was deployed to the North of the Drygalski Ice Tongue on 14 December 2 ...

2 Research Collaboration with Russia



Monitoring Activities in Russia (Plan)

Collaboration with AARI (Arctic & Antarctic Research Institute of Russia)



ANNEX TO MEMORANDUM OF UNDERSTANDING BETWEEN THE KOREA POLAR RESEARCH INSTITUTE (KOPRI) AND

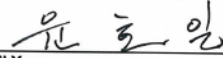
THE ARCTIC AND ANTARCTIC RESEARCH INSTITUTE OF ROSHYDROMET (AARI)

This Annex is derived from the Memorandum of Understanding between THE KOREA POLAR RESEARCH INSTITUTE (KOPRI) and THE ARCTIC AND ANTARCTIC RESEARCH INSTITUTE OF ROSHYDROMET (AARI), which is signed together on the same date and outlines cooperative measures that will be taken for the joint studies on the impact of climate changes on permafrost and ecosystems and its effect in atmosphere in the area of Severnaya Zemlya archipelago and around the Research base "Cape Baranova" (Bolshevik Island) in particular. These studies will also contribute to the implementation of WMO polar related programs like YOPP and CryoNet.

1. KOPRI will install research equipment ⁶⁾ with support from Russian personnel and utilize AARI's Arctic observatory to undertake collaborative research on the monitoring of climate change impacts.
2. Data generated from the KOPRI's research equipment installed at the AARI observatory will be provided to KOPRI, and will be used for joint research purposes.
3. Principal Investigators of KOPRI and AARI will share field data in an equal and fair manner.
4. KOPRI will bear the cost for using the AARI observatory and all expenses from shipping, installation, and maintenance of the research equipment.
5. The Parties will coordinate the overall protocol and arrange cooperation in the production, analysis, and publication of data via mutual consultation and agreement between the Principal Investigators (PIs) nominated to represent his or her respective Party.
6. Legal support, selection and publication procedure of all results obtained during joint studies in accordance with this Annex shall be based on mutual agreement between the Parties.
7. Sharing of any of working materials (i.e. specimens and samples) from joint studies with a third Party requires a mutual agreement of both Parties.
8. The Parties will endeavor to promote the exchange of expertise and to further develop cooperative efforts in research and education.
9. This Annex is issued in English, and will take effect upon signature by both Parties. Any amendment of this Annex will require written approval of both Parties.

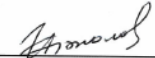
⁶⁾ Installation and use of foreign research equipment on Research base "Cape Baranova" must be done in accordance to " Provision on Installation and use of foreign research equipment on Russian Federation territory, continental shelf and in the limits of EEZ of Russian Federation." Korean scientists accessing Russian research sites and facilities are required to abide by "Rules of boundary regime of Russian Federation"

FOR THE KOREA POLAR RESEARCH
INSTITUTE OF THE REPUBLIC OF
KOREA


Ho Il Yoon
President, Korea Polar Research
Institute

Date: 29 Nov 2016

FOR THE ARCTIC AND ANTARCTIC
RESEARCH INSTITUTE OF
ROSHYDROMET OF RUSSIAN
FEDERATION

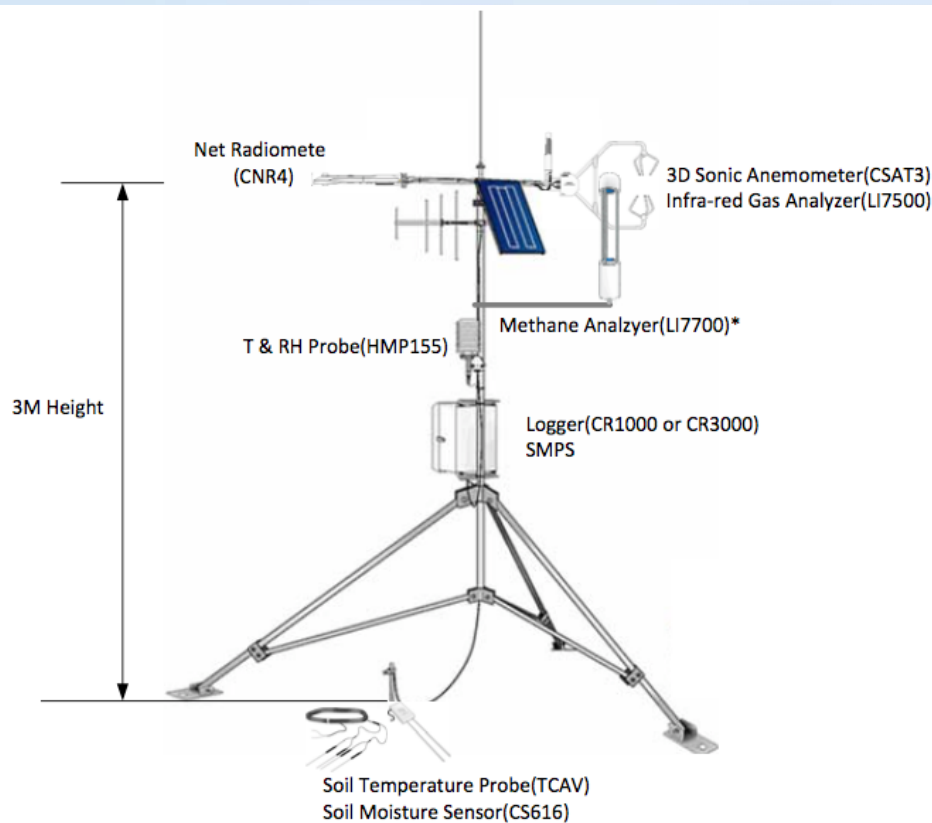

Ivan Frolov
Director, Arctic and Antarctic Research
Institute

Date: 19.12.2016

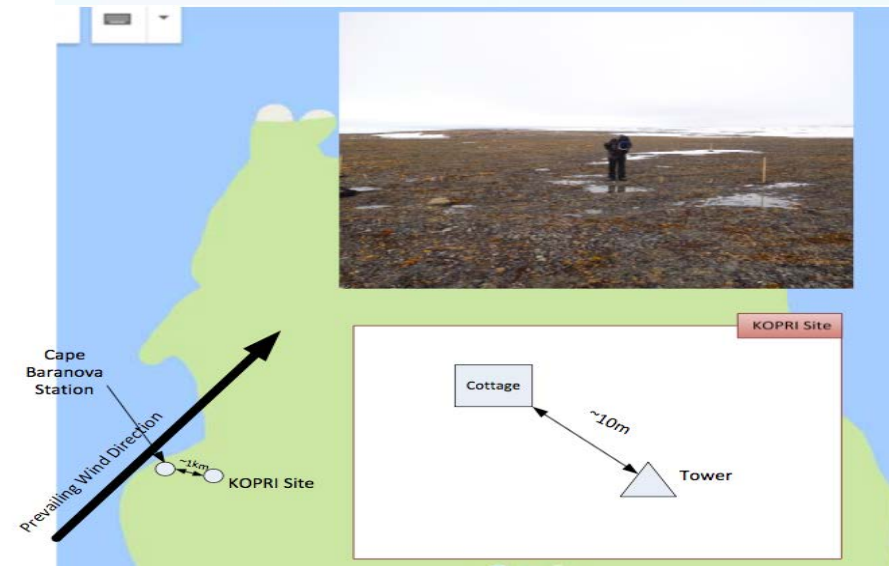
Monitoring Activities in Russia (Plan)

Greenhouse gas (and energy) fluxes exchanged between the atmosphere and permafrost in the Ice Base Cape Baranova

KOPRI measurement system to be installed



KOPRI site 1 km away from the Baranova base



3 Arctic Outreach Activities



Photo Exhibitions

- Photo exhibitions on Arctic Tundra have been held since 2014.

**Photo Exhibition:
Arctic Tundra**

북극생태 사진전



2014. 4. 15 - 20
서울메트로미술관
(경북공지하철역 지하층)

주최/주관: AOPRA, 국립자연사박물관, 후원: 국립생태원, 국립생태원, 국립생태원, 국립생태원

2017 서대문자연사박물관 특별전

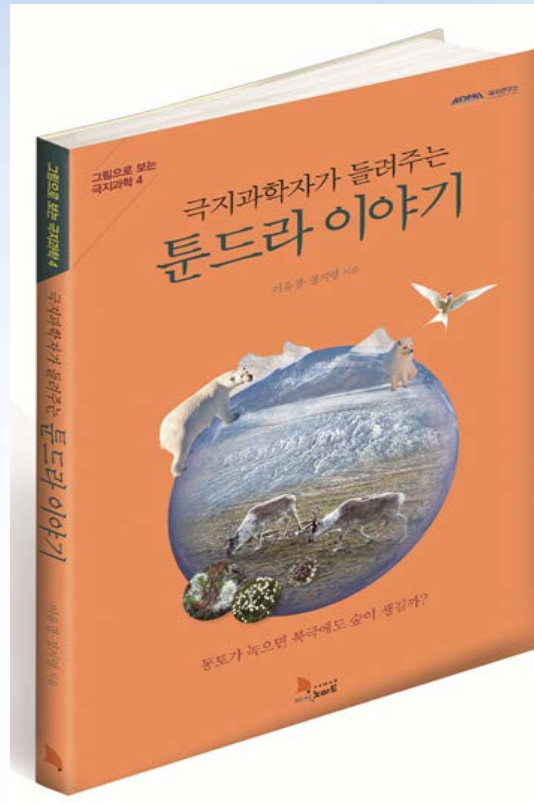
북극생태 사진전

2017. 5. 5 ~ 6. 6



Books

- KOPRI has published top quality popular science books.



Outreach Program - 21C Dasan Junior

- 4 high school students were selected on the basis of their research plans.
- They visit Arctic Station, making field trips and performing lab experiments.
- The 21C Dasan Junior activities are blogged on websites of KOPRI, and YouTube.





Arctic Knowledge Center

- For stake-holders, researchers & ordinary people
- Information, knowledge & news in Korean

북극에 대한 모든 지식
북극지식센터 **www.arctic.or.kr**

북극이란 북극이사회 한국북극연구컨소시엄 북극정책 연구활동 북극관련기구 북극소식



북극을 지켜온 동물들

사람보다 먼저 북극의 땅과 바다를 지켜온 동물들이 있다. 북극곰, 일각고래, 순록 같은 동물들은 차가운 얼음바다와 동토의 땅에서 평화롭게 조화를 이루며 삶의 터전을 일구며 살아왔다.



ARCTIC COUNCIL

북극이사회 <북극의 전통 지식과 지혜.. > +

북극이사회 CAFF(북극 동식물 보존 작업반)은 <북극의 전통 지식과 지혜 - 북미 북극의 변화> 보고서를 발간하였다. 이 보고서는 많은 부분이 북극 원주민에 의해 작성되었으며, 북극 생물 다양성과 생물 다양성 변화의 특성을 제대로 이해하기 위해서는 과한..



[more →](#)



ARCTIC RESEARCH CONSORTIUM

세계 최초의 한국산 채빙 LNG운반선, .. +

세계 최초의 상업용 채빙 LNG운반선인 크리스토프 드 마제미(Christophe de Margerie)가 북극항로를 이용하여 노르웨이의 스노히트(Snohvit) 유전에서 한국까지 LNG 수송 중이다. 지난 7월말 노르웨이 국영석유회사 스타토일(Statoil)의 멜코야(Melkoya) 가스 터미널을 출발한 ..



[more →](#)



ARCTIC NEWS

북극 툰드라, 기후변화로 인해 수은 .. +

미국과 프랑스 연구팀은 북극 툰드라 수은(Hg) 오염이 툰드라에서 강으로, 결국 북극해로 확산되어 해양 생태계와 나아가 원주민들까지 위협한다는 연구 결과를 '네이처'에 발표했다. 따뜻한 기온과 일조량이 많은 지역에서 흡수된 Hg(g)는 공기 중으로 방출되지만 ..



[more →](#)

Спасибо!

