2013/02/16

Syowa in summer
(6 February, 2013)

NiPR
National Institute of Polar Research

The Japanese Antarctic Research Expedition (JARE) in progress and its organization

- Brief History of JARE
- Organization
- Scientific Activities
- Logistics

Kentaro Watanabe
International Affairs Section
National Institute of Polar Research
Expedition Leader of JARE-54 (2012-2014)

History of JARE

1910-12
Nobu Shirase
(Private Expedition)

80°05'S
156°37'W

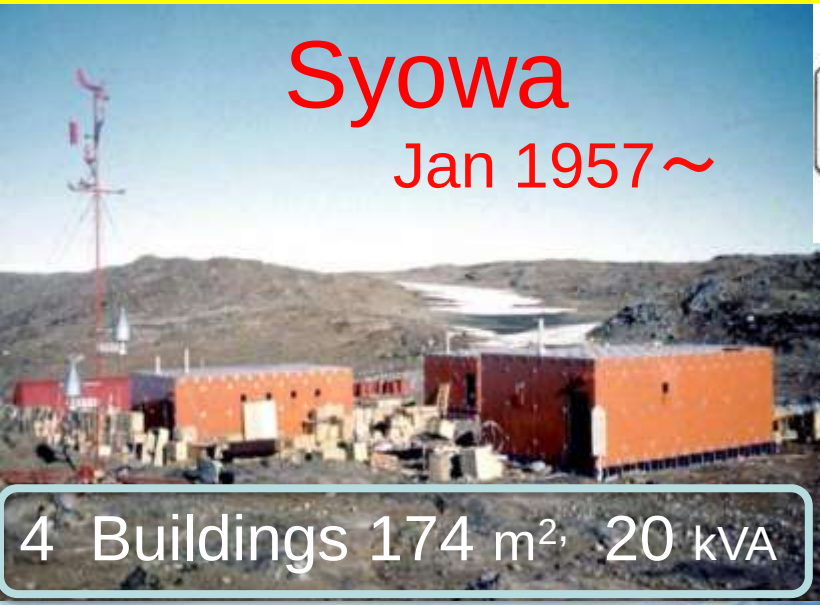
Kainan-maru (204 tons)

ANNÉE GÉOPHYSIQUE INTERNATIONALE
1957 1958
INTERNATIONAL GEOPHYSICAL YEAR

1956-58
1st Japanese
Antarctic
Research
Expedition

R/V Soya

Japanese Antarctic Stations



4 Buildings 174 m², 20 kVA

61 buildings, 6,778 m²
300 kVA x 2(+200 kVA)

JARE-55 Voyage of *Shirase*

Total days	**151 days**
Within Antarctic circle	**99 days**
Total voyage	**~20,000 miles**

Tokyo
Nov. 8, 2013 Dep.
Apr. 7, 2014 Arr.

Fremantle
Nov. 22, 2013 Arr.
Nov. 27, 2013 Dep.

Australia

Sydney
Mar. 15, 2014 Arr.
Mar. 21, 2014 Dep.

Lützow-Holm Bay

Syowa Stn

New Icebreaker *"Shirase"*

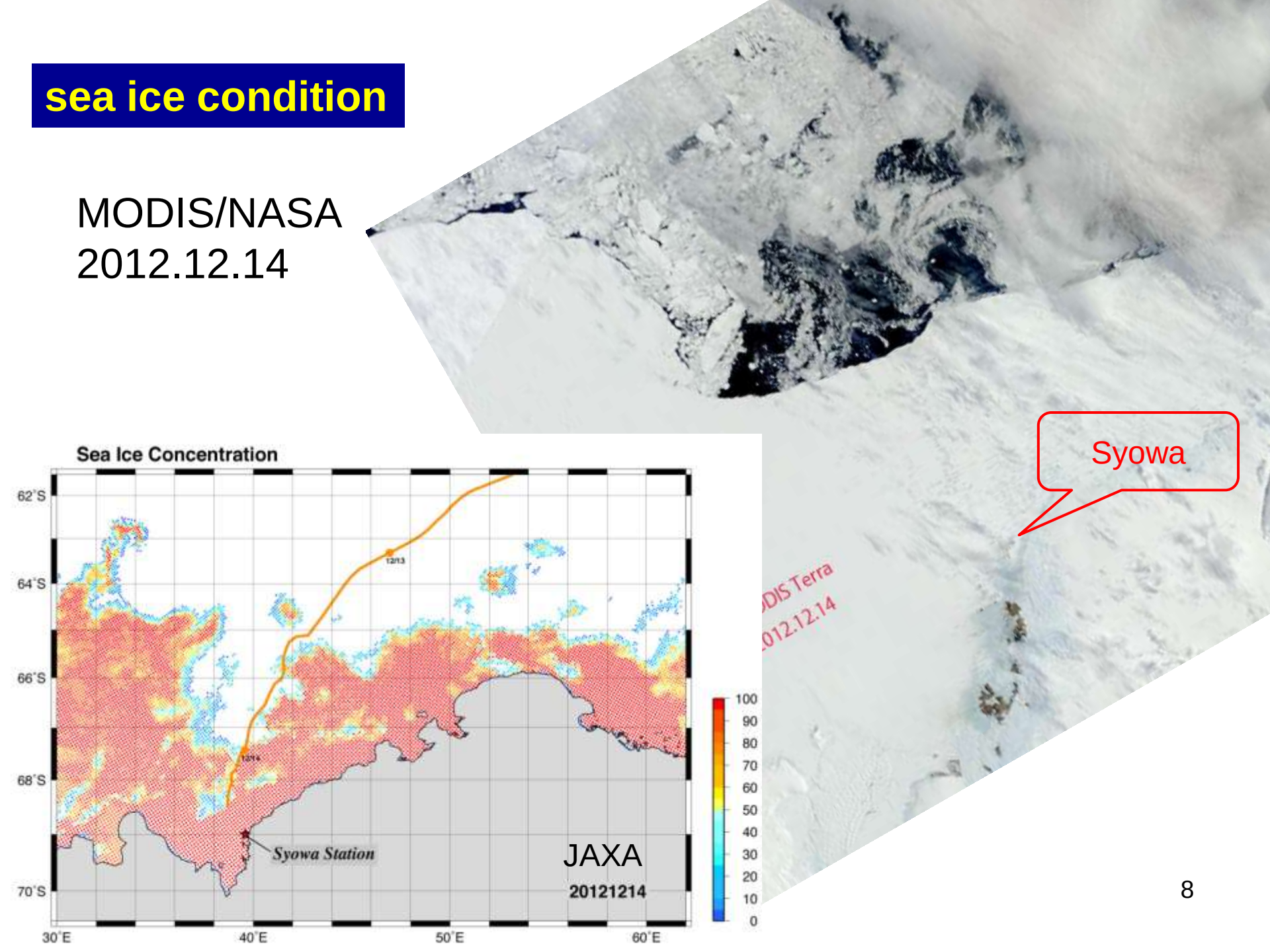
Length	~ 134 m
Max. width	~ 28 m
Depth	~ 16 m
Displacement	12,500 tons
Cargo	Cargo : ~ 500 tons Fuel: ~ 600 tons
PAX	80
Crew	179
Structure	Double hull
Engines	Diesel electric 2-axes propeller
Power	30,000 HP

"Umitaka-maru" Tokyo University of Marine Science and Technology

Length: 93m, 1,886t, 17.4kt

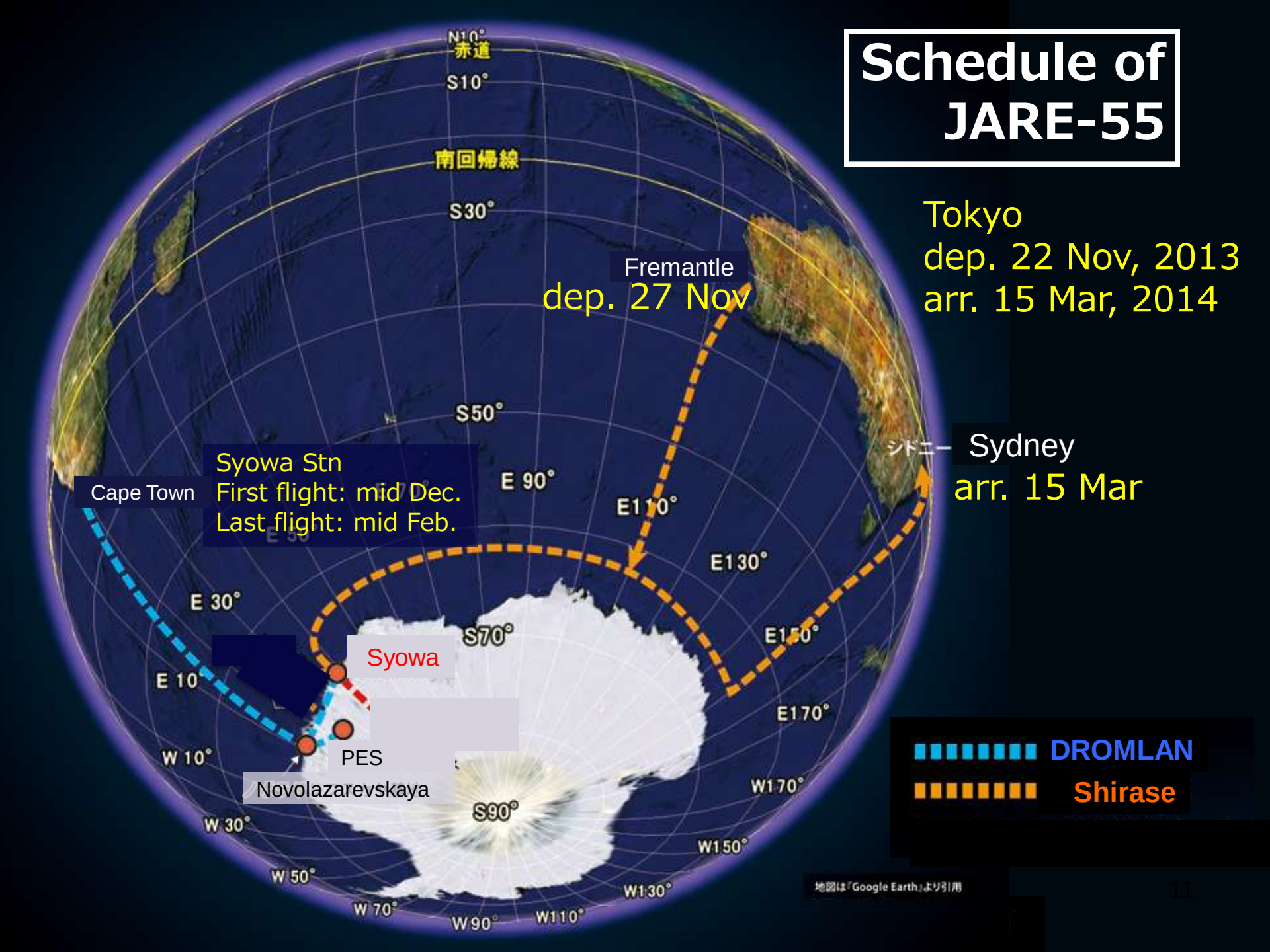
sea ice condition

MODIS/NASA
2012.12.14

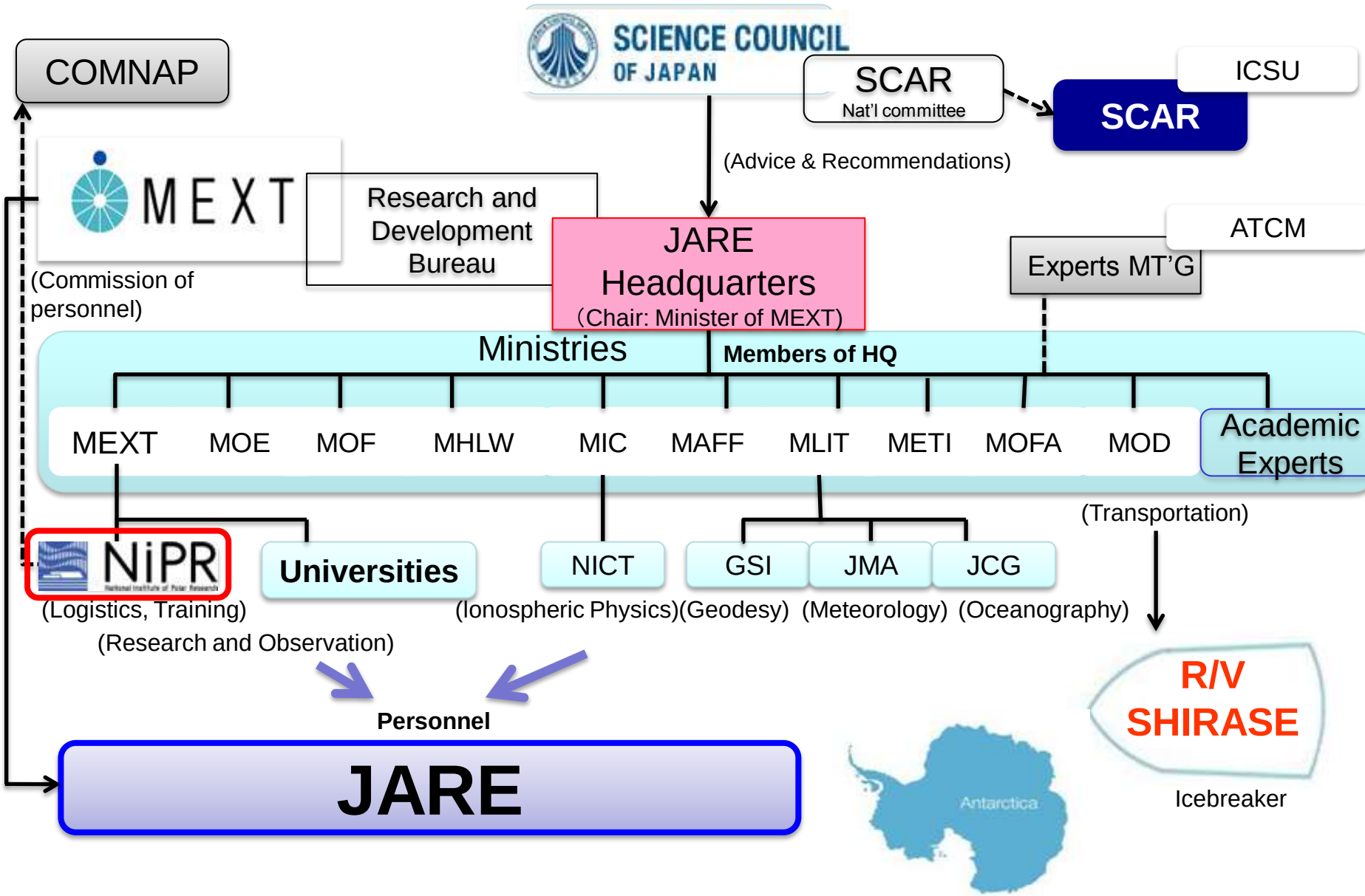


Syowa (69°S, 39.5°E) in winter
5 km from Antarctic Continent

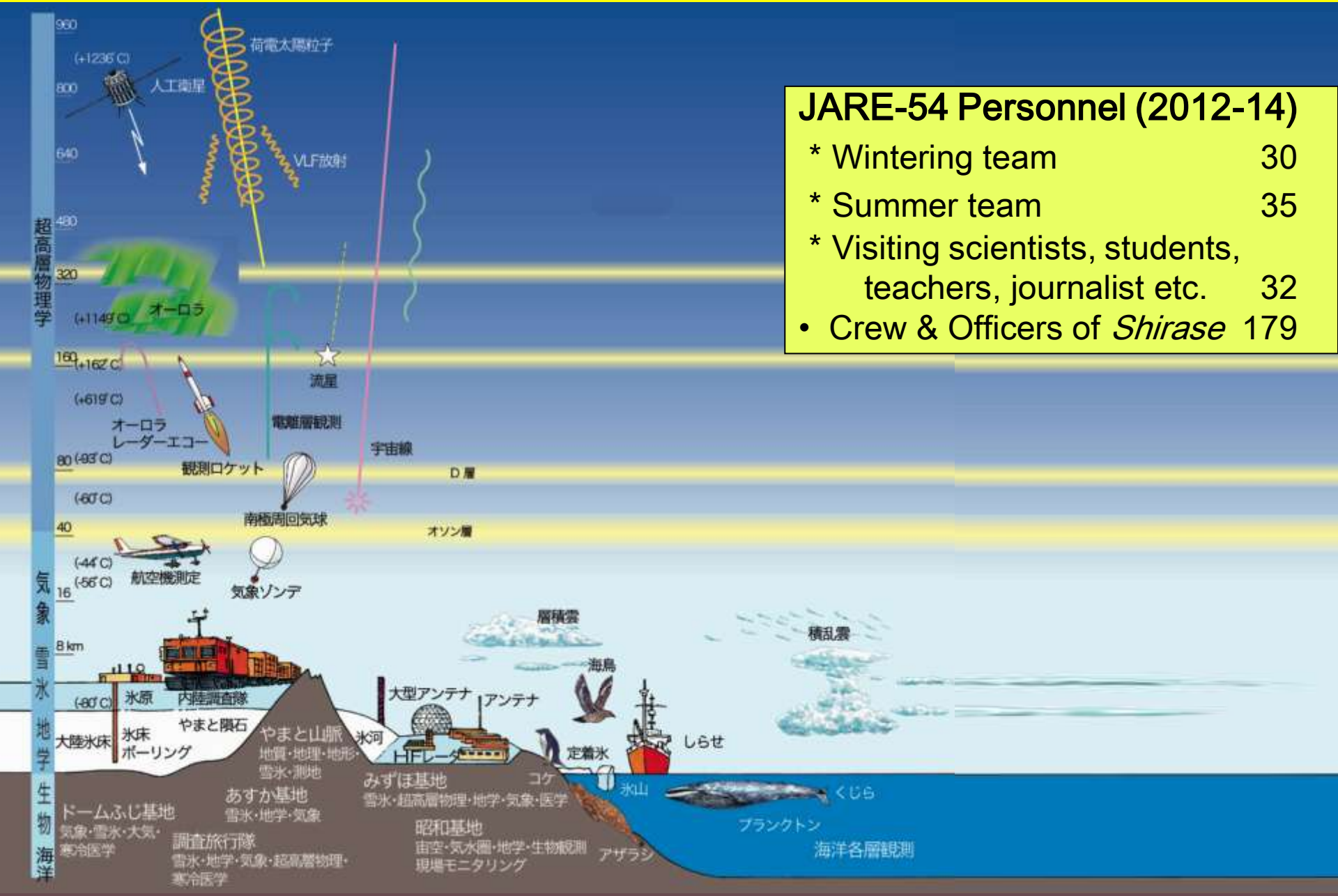
DRONNING MAUD LAND AIRNETWORK (DROMLAN)


Schedule of JARE-55
Tokyo
dep. 22 Nov, 2013
arr. 15 Mar, 2014
Fremantle
dep. 27 Nov
Sydney
arr. 15 Mar
Syowa Stn
First flight: mid Dec.
Last flight: mid Feb.
Cape Town
Syowa
PES
Novolazarevskaya
DROMLAN
Shirase
N10°
赤道
S10°
南回帰線
S30°
S50°
E 90°
E110°
E130°
E150°
E170°
E 30°
E 10°
S70°
W 10°
W 30°
W 50°
W 70°
W 90°
W110°
W130°
W150°
W170°
S90°
地図は「Google Earth」より引用

Organization of JARE



Science of JARE



New Era of JARE

ANTARCTICA

as a Window of Global Environment and Space

First observation of "Polar Mesosphere Cloud" at Syowa Sta. Feb. 11, 2009

Innovative Antarctic research

Japanese Antarctic Program VIII
(2010-2016)

"Global Warming"

High-level research through national and international collaboration

Contribution to the future of human beings through the investigation of global environmental issues.

Japanese Antarctic Program VIII (2010-2015)

Principal Research Projects

"Global Warming" (PANSY etc.)

Bottom-up programs

- General Research Projects
- Preliminary Research Projects

Basic Observation Programs

- Routine observation

  by governmental agencies

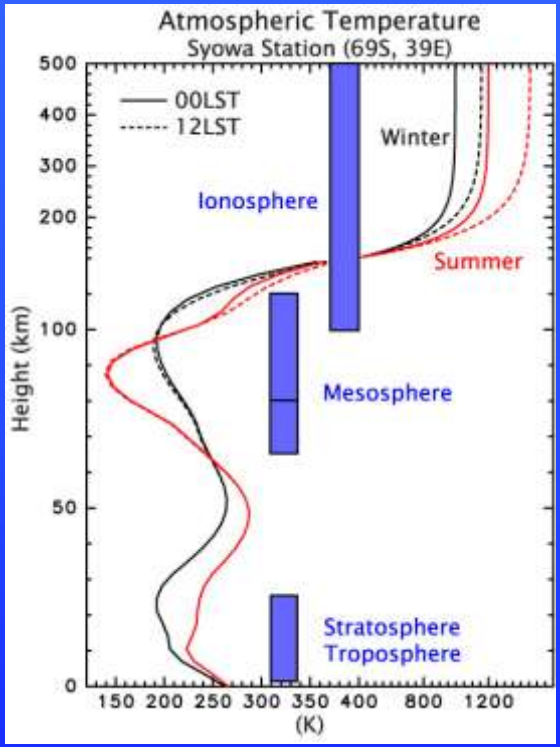
  (JMA, GSI, JCG etc.)

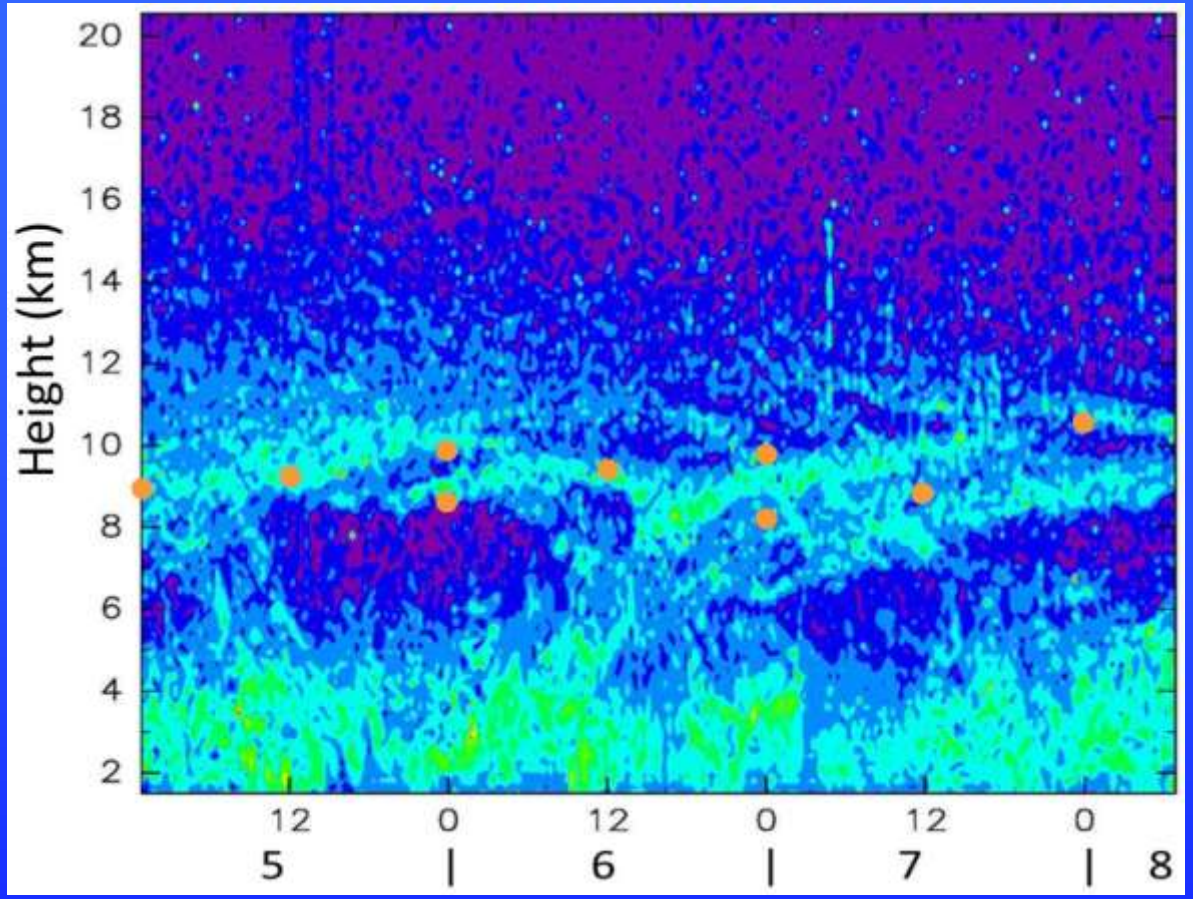
- Monitoring observations by NIPR

Program of the Antarctic Syowa MST/IS radar (PANSY)

Continuous monitoring of Antarctic lower and middle atmosphere using the first Antarctic large aperture atmospheric radar PANSY started at Syowa

NiPR
National Institute of Polar Research





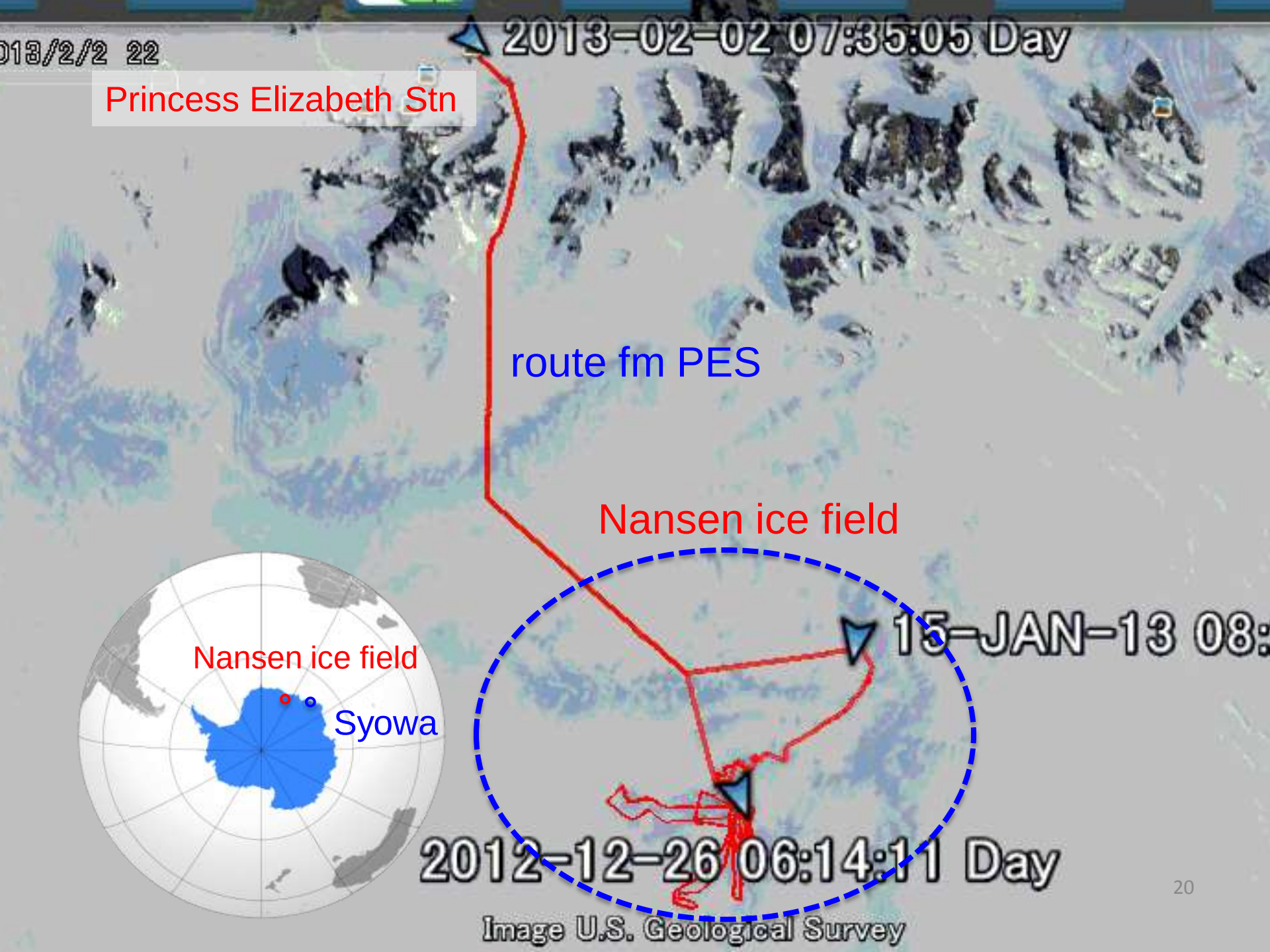
An example of continuous PANSY operation for the troposphere and stratosphere: Complicated structures in the polar atmosphere are seen in the height-time section of echo power observed using the vertical beam during May 5–8, 2012. Warmer colors indicate stronger radar echoes. The orange dots denote the tropopause determined by twice daily radiosonde observations at Syowa Station conducted by the Japan Meteorological Agency.

NiPR
National Institute of Polar Research

Meteorite search on the Nansen Ice Field by JARE-54 in collaboration with BELARE

2012.12.26
PES～Nansen ice field
by snow mobiles

2012.12.24
dep. SnowVehicles
for Logistic Support
by BELARE@PES


013/2/2 22
2013-02-02 07:35:05 Day
Princess Elizabeth Stn
route fm PES
Nansen ice field
Nansen ice field
Syowa
15-JAN-13 08:
2012-12-26 06:14:11 Day
Image U.S. Geological Survey

Meteorite Search

distance between vehicles: <100 m, usually 30-50 m

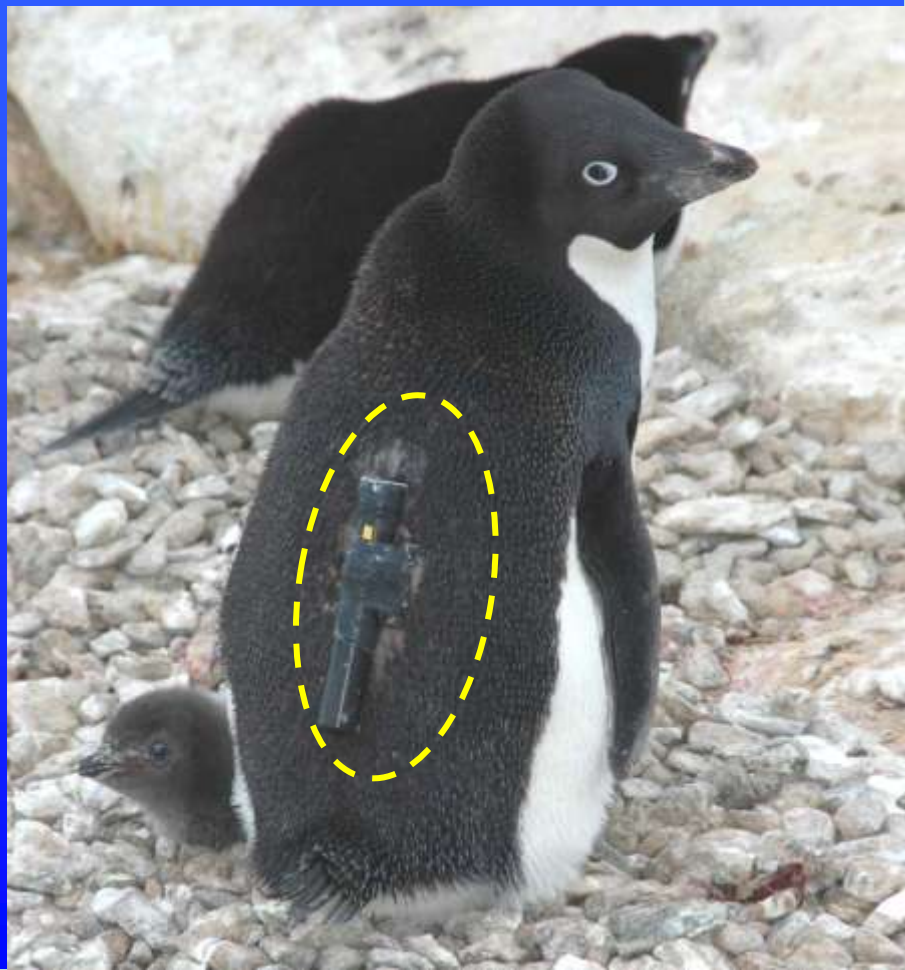
in V-shaped formation with center vehicle in sight

the largest meteorite collected in this expedition, 18 kg in weight, collected on 28 January 2012

NiPR
National Institute of Polar Research

Penguin ecology study with micro data loggers (biologging)

- observation of diving behavior of penguins
- observation of the surrounding environment including food
- with micro data loggers equipped with GPS, camera, accelarators etc.



penguin monitoring site for JARE

January, 2011

ca 100 nests

January, 2013

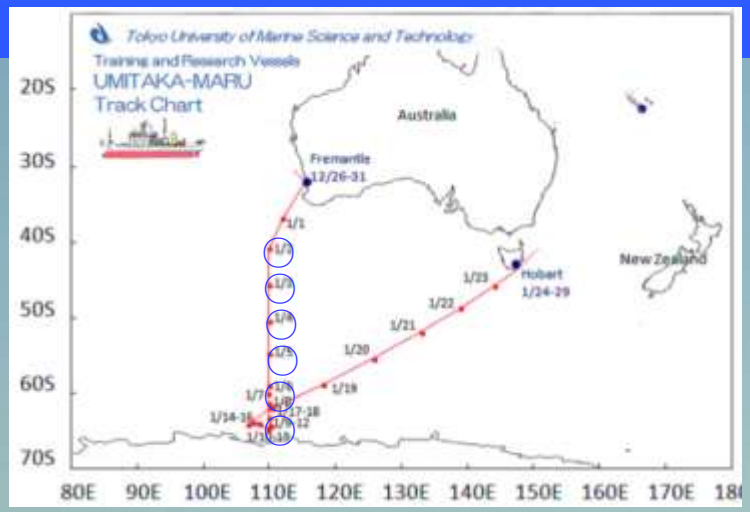
ca 460 nests

observations of ecosystem through penguin's eyes

detailed observation of penguin behavior with video camera, GPS, accelerator etc.
=>analyze climate change effect on penguins

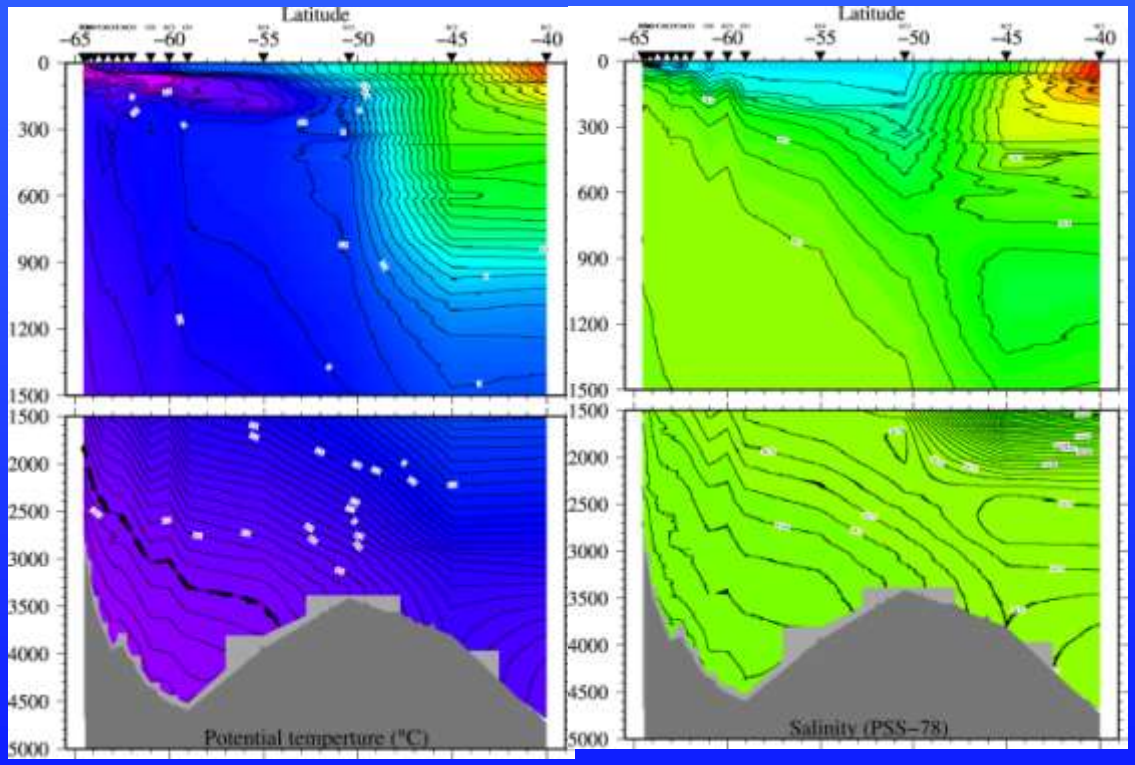
Oceanographical observation
TRV Umitaka-maru

Tokyo University of Marine Science and Technology (TUMSAT)



Physiological oceanography

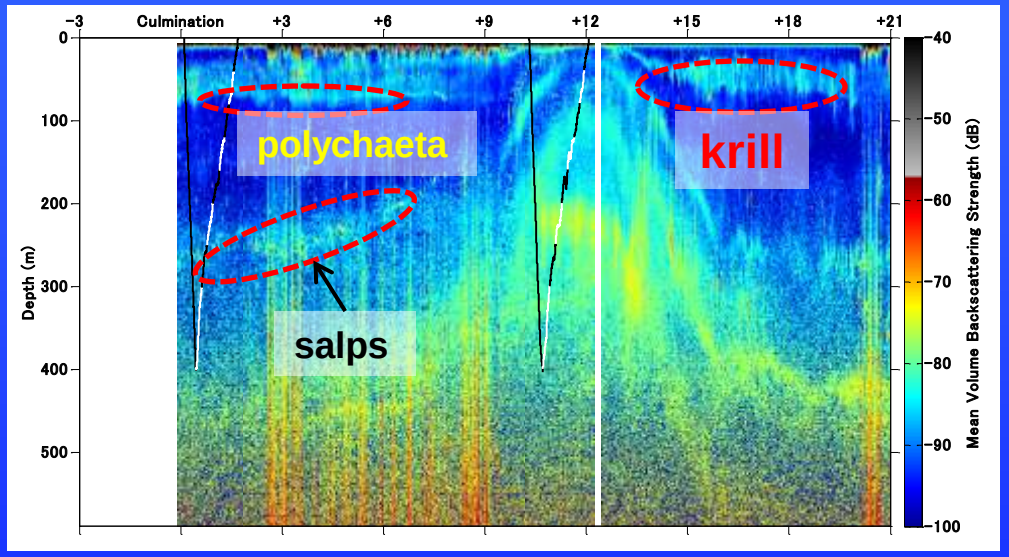
- Routine observation for the Indian sector of the Southern Ocean along 110E and 150E
- Continuous sea surface observation: T, S, in vivo Chl.a, pCO2 etc.



Temperature（left）and salinity（right） along 110E

Marine biological observation

Mid water trawl at depths（200-2000 m）with an opening-closing net at daytime and night.



Logistics in summer

Maintenance of generators

Transportation by helicopters to Syowa Station

Cruise Route to Syowa

JARE53