Syowa in summer
( 6 February, 2013)
The Japanese Antarctic Research Expedition (JARE) in progress and its organization

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

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International Affairs Section
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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)

1956-58
1st Japanese Antarctic Research Expedition

R/V Soya
Japanese Antarctic Stations

Syowa
Jan 1957～
4 Buildings 174 m², 20 kVA
61 buildings, 6,778 m²
300 kVA x 2 (+200 kVA)

Dome Fuji
1995～
3.810m a.s.l.
Annual Mean Temp. -54.3°C
JARE-55 Voyage of Shirase

<table>
<thead>
<tr>
<th>Total days</th>
<th>151 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Antarctic circle</td>
<td>99 days</td>
</tr>
<tr>
<td>Total voyage</td>
<td>~20,000 miles</td>
</tr>
</tbody>
</table>

- **Syowa Stn**
  - Nov. 8, 2013 Dep.
  - Nov. 22, 2013 Arr.
  - Nov. 27, 2013 Dep.

- **Fremantle**
  - Mar. 21, 2014 Dep.

- **Tokyo**

- **Sydney**

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


Australia
### New Icebreaker “Shirase”

<table>
<thead>
<tr>
<th><strong>Length</strong></th>
<th>~134 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max. width</strong></td>
<td>~28 m</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>~16 m</td>
</tr>
<tr>
<td><strong>Displacement</strong></td>
<td>12,500 tons</td>
</tr>
</tbody>
</table>
| **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

JAXA

Syowa
Syowa (69°S, 39.5°E) in winter 5 km from Antarctic Continent
DRONNING MAUD LAND AIRNETWORK (DROMLAN)

South Africa
Finland
Germany
Japan
Russia
Sweden
Norway
United Kingdom
Holland
Belgium
India

1100km

Capetown

Neumayer
Sanae IV
Troll
Maitri
Novo-Nazarovskaya
Syowa
Schedule of JARE-55

Syowa Stn
First flight: mid Dec.
Last flight: mid Feb.

Cape Town

Syowa

PES

Novolazarevskaya

DROMLAN

Shirase

Tokyo
dep. 22 Nov, 2013
arr. 15 Mar, 2014

Fremantle
dep. 27 Nov
arr. 15 Mar

Sydney
Organization of JARE

JARE Headquarters
(Chair: Minister of MEXT)

Ministries
- MEXT
- MOE
- MOF
- MHLW
- MIC
- MAFF
- MLIT
- METI
- MOFA
- MOD

Members of HQ

Academic Experts

Universities
- NICT
- GSI
- JMA
- JCG

NiPR
(Logistics, Training)
(Commission of personnel)
(Research and Observation)

Research and Development Bureau

SCAR
Nat'l committee
(Advice & Recommendations)

SCAR

COMNAP

MEXT

ATCM

Experts MT’G

JCG

GSI

JMA

NICT

R/V SHIRASE
Icebreaker

R/V

Personnel

MEXT

MOE

MOF

MHLW

MIC

MAFF

MLIT

METI

MOFA

MOD

JARE

Nicola

Antarctica
Science of JARE

JARE-54 Personnel (2012-14)
* Wintering team 30
* Summer team 35
* Visiting scientists, students, teachers, journalist etc. 32
• Crew & Officers of Shirase 179
New Era of JARE

ANTARCTICA
as a Window of Global Environment and Space

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.

First observation of “Polar Mesosphere Cloud” at Syowa Sta. Feb. 11, 2009
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
Continuous monitoring of Antarctic lower and middle atmosphere using the first Antarctic large aperture atmospheric radar PANSY started at Syowa
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.
Meteorite search on the Nansen Ice Field by JARE-54 in collaboration with BELARE

4 JARE personnel and 7 BELARE personnel
2012.12.26
PES~Nansen ice field by snow mobiles

2012.12.24
dep. SnowVehicles for Logistic Support by BELARE@PES
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
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, accelerators 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