International Polar Year 2032–2033

China's Potential Contributions to IPY5: Preliminary Concept

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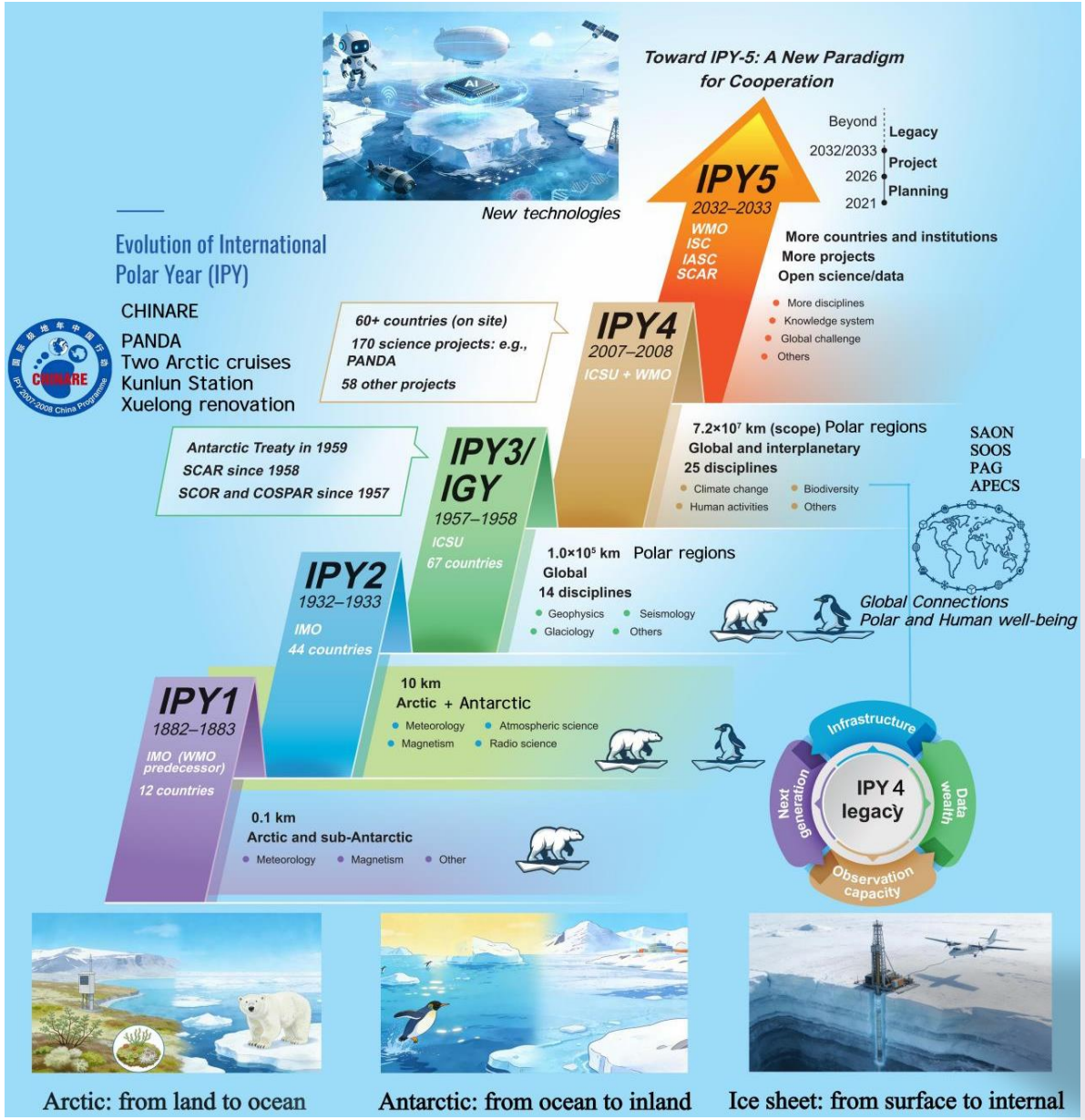
Polar Research Institute of China

International Polar Year
2032–2033

Contents

- Retrospect of past International Polar Years
- Chinese activities and contributions to IPY-4
- Growth milestones of CHINARE program since IPY-4
- China's potential contributions to IPY5



IPY4 boasts an unprecedented level of disciplinary and national coverage

Characteristics of the International Polar Years (IPY)

	IPY-1	IPY-2	IPY-3*	IPY-4†
Dates	1882–83	1932–33	1957–58	2007–??
Nations	11	40	67	all (>191)
Disciplines	3	4	14	≈25
Solar activity	maximum	minimum	maximum	maximum
Distance from Earth surface	ground-based (≈0.1 km)	≈10 km	≈100,000 km	≈72,000,000 km
Region	Arctic and Antarctic	Arctic	global	global and interplanetary

IPY4 Achievements

Four legacies of IPY4: observational capacity, data, a new generation of young researchers, and infrastructure

- The final meeting of the IPY4 Joint Committee (Oslo, June 2010) marked the conclusion of IPY4.

- Global polar linkages of polar systerm
- New observational systems providing data for prediction
- Ice sheets – large-scale changes, dynamics and subglacial hydrology
- New integration – integration across diverse fields, scales and disciplinary
- Novel perspectives on polar marine and terrestrial biodiversity

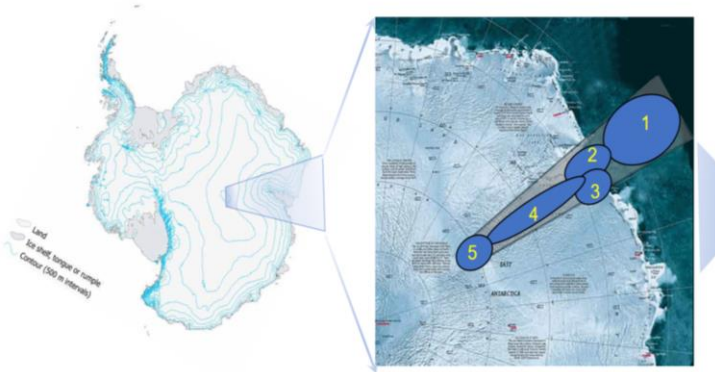
Chinese National Action Program for the IPY-4

- PANDA: the Antarctic Prydz Bay-Amery Ice Shelf-Dome A: Integrated Section Scientific Expedition and Research
- Arctic Scientific Expedition and Research
- International Cooperation Program
- Outreach and Education

Launch ceremony, 1 March 2007

National Summary Conference, 8 April 2011

➢ Where is PANDA? (Prydz bay-Amery ice shelf-Dome A)
南极普里兹湾—埃默里冰架—冰穹A



1 Eastern South Indian Ocean - Prydz Bay

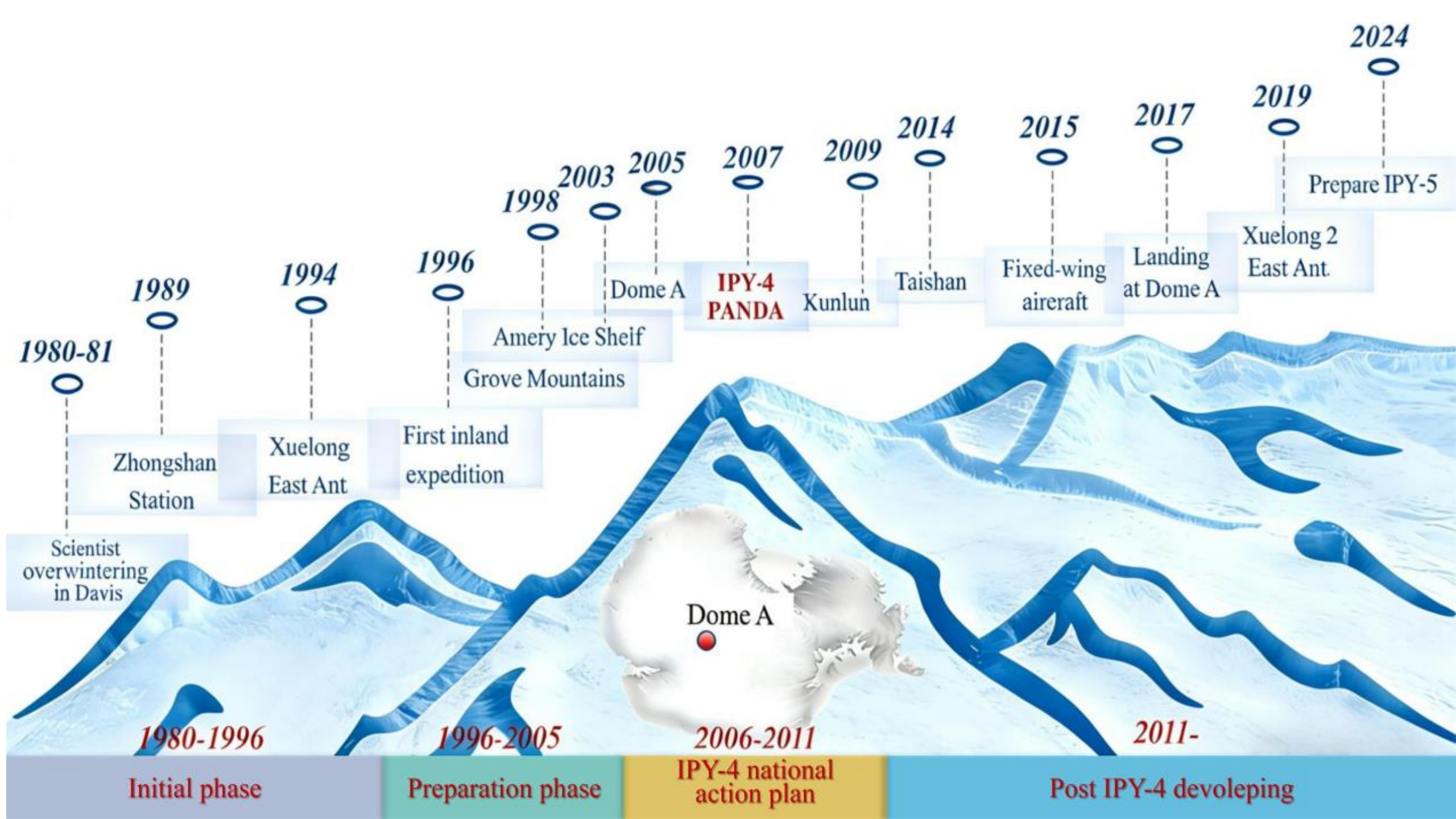
2 Amery Ice Shelf (Lambert glacier)

3 Zhongshan Station

4 Zhangshan-Dome A section (Princess Elizabeth land) & Grove Mountains

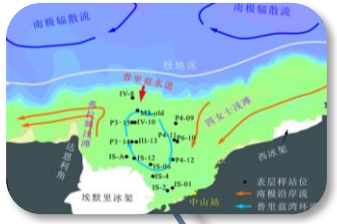
ANd

5 Dome A (Gamburtsev Mountains)

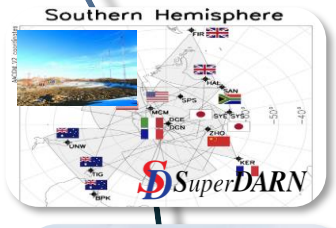

1980-81
Scientist overwintering in Davis
1989
Zhongshan Station
1994
Xuelong East Ant
1996
First inland expedition
1998
Amery Ice Sheif
Grove Mountains
2003
2005
Dome A
2007
IPY-4 PANDA
2009
Kunlun
2014
Taishan
2015
Fixed-wing aireraft
2017
Landing at Dome A
2019
Xuelong 2 East Ant.
2024
Prepare IPY-5
Dome A
1980-1996
1996-2005
2006-2011
2011-
Initial phase
Preparation phase
IPY-4 national action plan
Post IPY-4 devoleping

Chinese Action Project: PANDA

Core Activities



- Investigations of the interaction between the **Southern Indian Ocean, Prydz Bay**, and **Amery Ice Shelf**



- Global collaborative observation based on **Zhongshan Station**

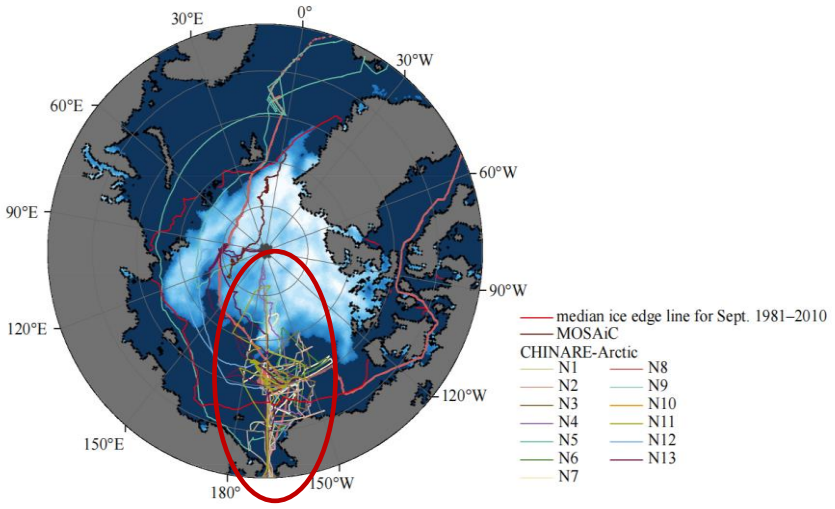
- Scientific expedition of **Grove Mountain**

- Observation of atmosphere and ice-sheet geophysics at the section from **Zhongshan to Dome A**

- Drilling of ice core at **Dome A** and bedrock cores beneath the ice sheet over the **Gamburtsev Mountain**

IPY4 Arctic Ocean-Chinese contributions

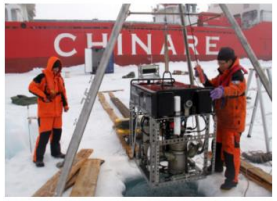
- Observation capability improvement: Xuelong renovation, Arctic exploration every 2 years since 2008, Xuelogn 2 Project
- International cooperation: PAG, DBO, DAMOCLES
- Ocean acidification, shelf-basin material and energy exchange, sea ice retreat, and their ecological and climatic effects
- Ice based buoy, underwater machine




polar ARV in the 3rd CHINARE


TS 4500 in the 12th CHINARE

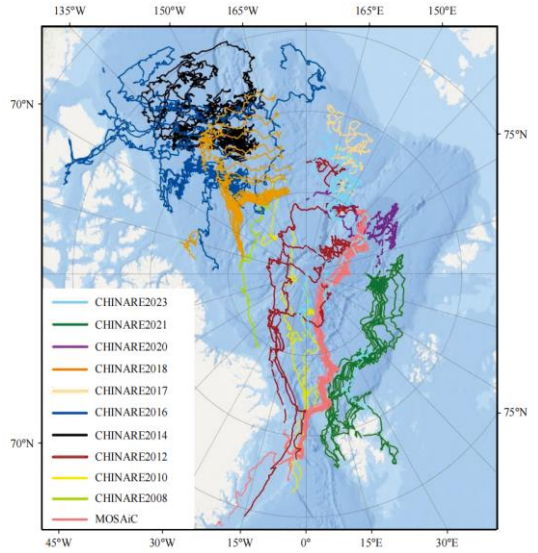

ITP in the 6th CHINARE

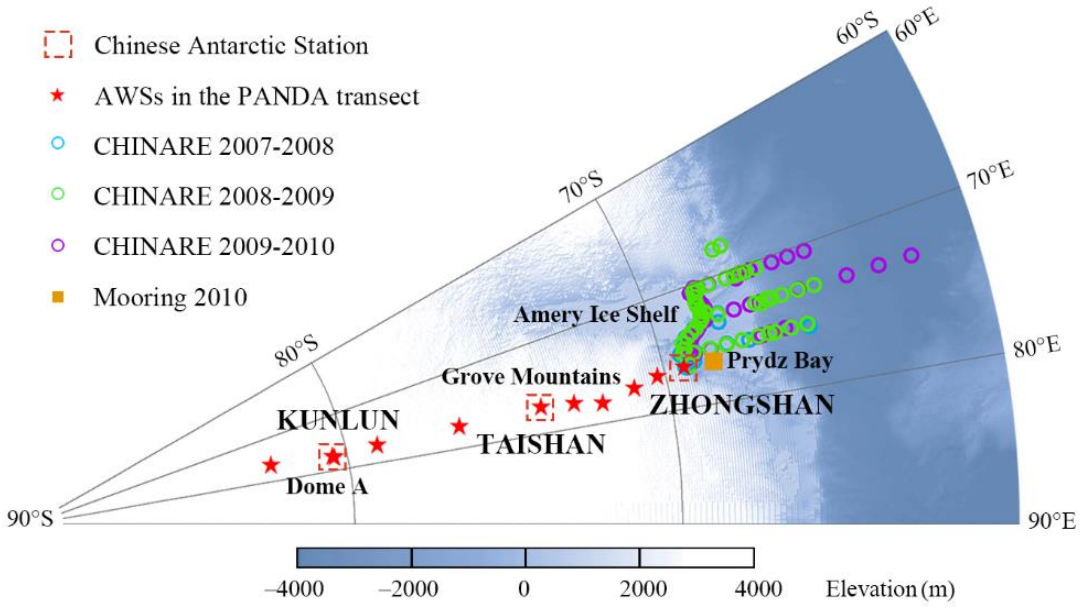


polar ARV in the 6th CHINARE

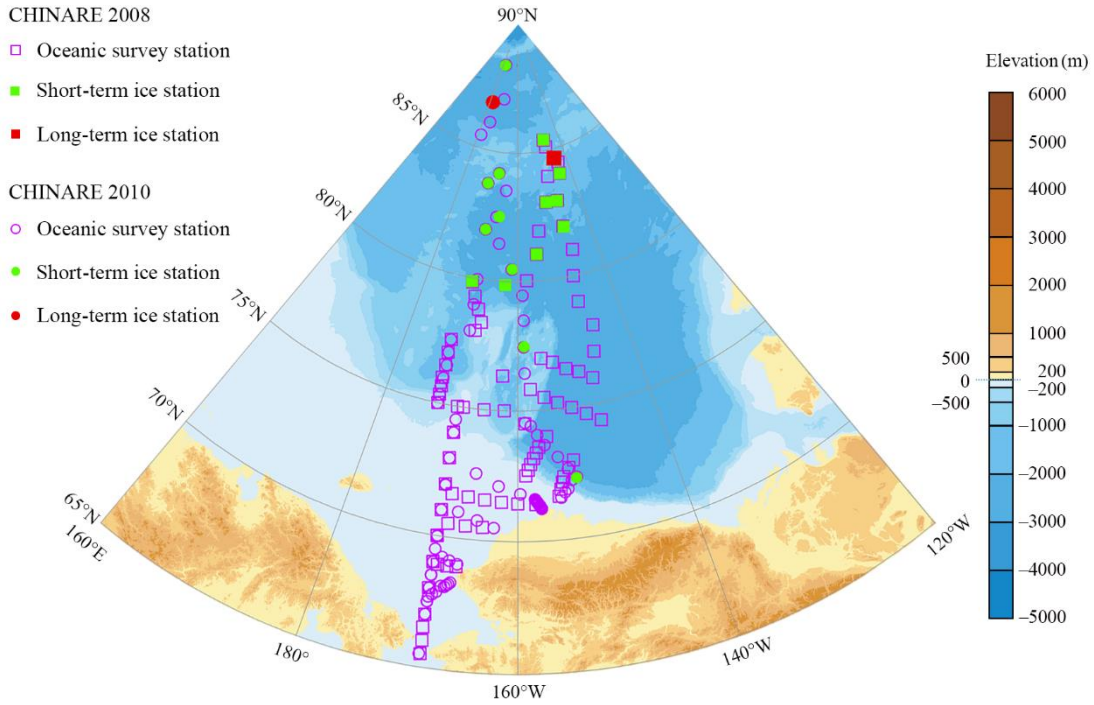

Xinghai 1000 in the 13rd CHNARE


Unmanned Ice Station:
in the 11th CHINARE





Antarctic PANDA



Arctic Ocean

Growing CHINARE and its support system

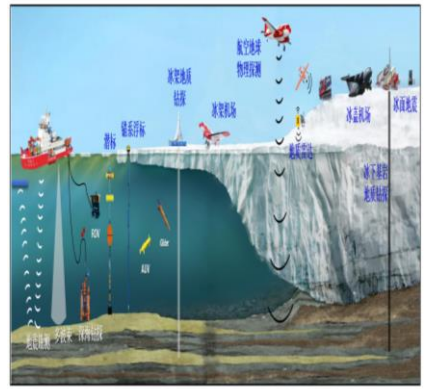
Logistics support system

Seven stations and two ships

Various research vessels with ice breaking capabilities

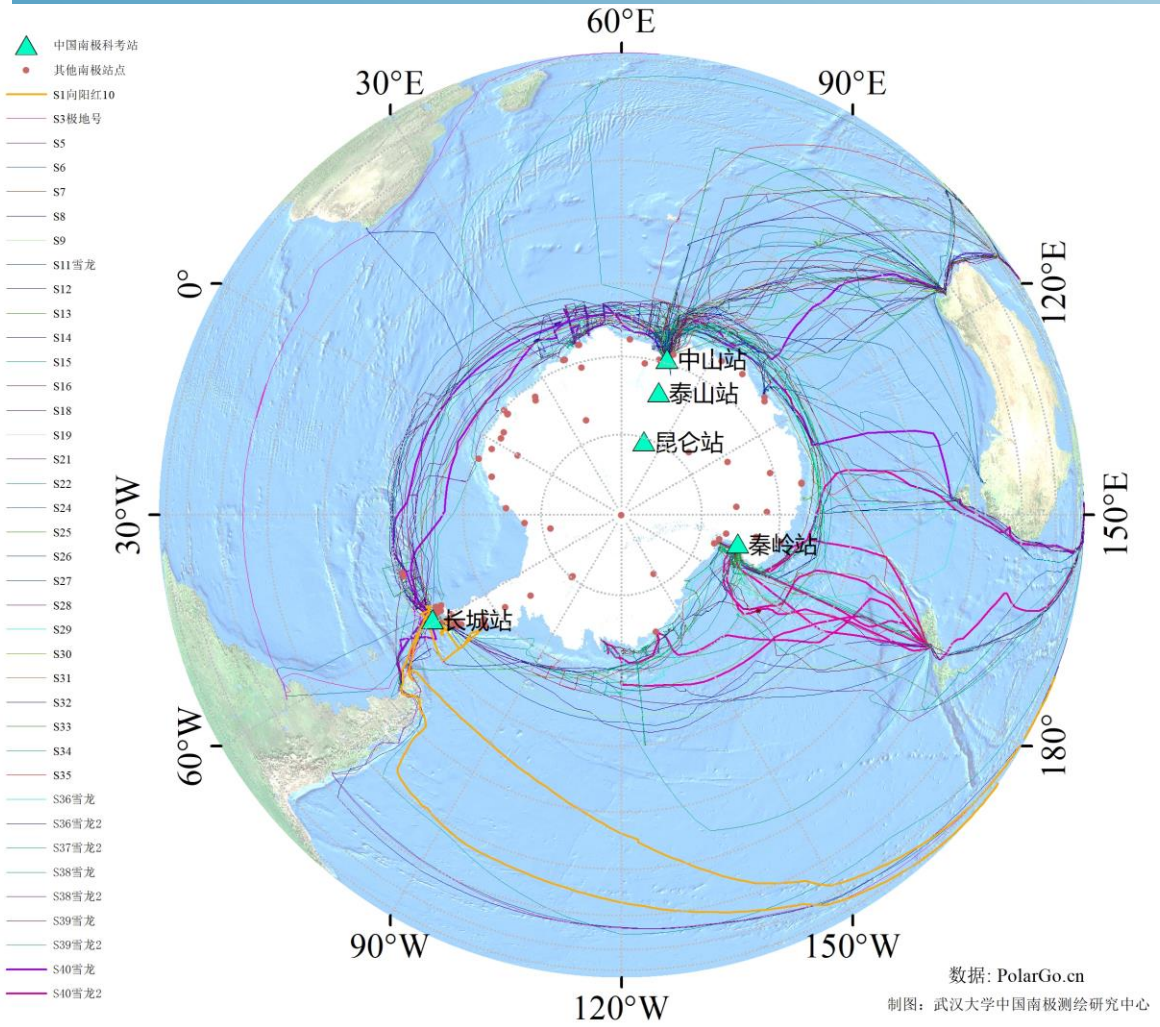
Transportation vehicles

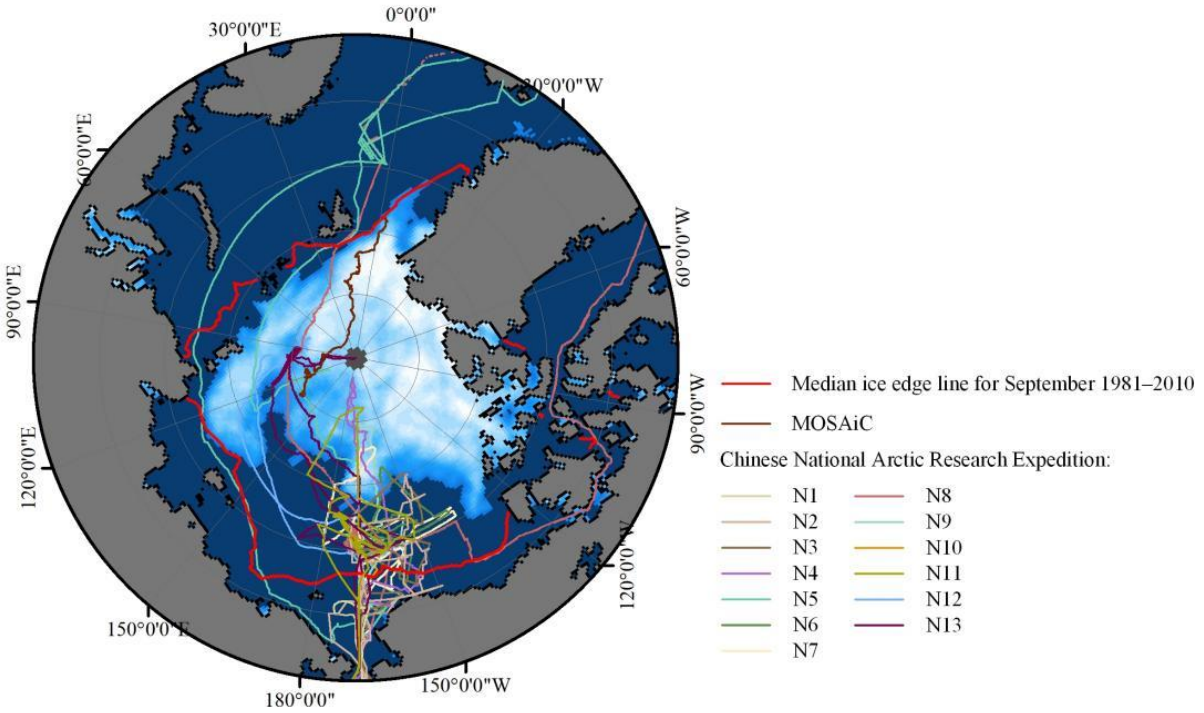
Unmanned scientific research station



Observation and detection technology

- After 40 years, the CHINARE research vessels have almost navigate across almost all main waters of the Southern Ocean and the Arctic Ocean
- But all the cruises are liminited in the warm season





IPY-5 China's activities

Logistic and technical support

Task

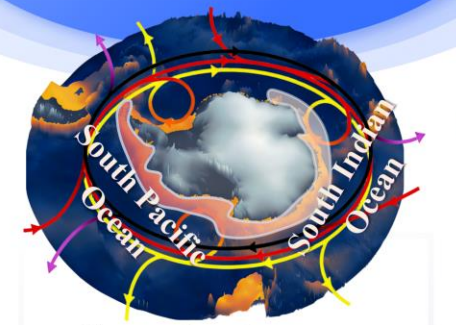
- Renovation of vessels and stations
- Observation instruments and deployments
- AI and other new technologies
- Polar monitoring satellite

Antarctic ice sheet

Task

- Stability of ice-stream systems in the EAIS
- Multidisciplinary research at Dome A
- Grove Mountains –Taishan Station
- Amery/Ross Ice Shelf

Interaction

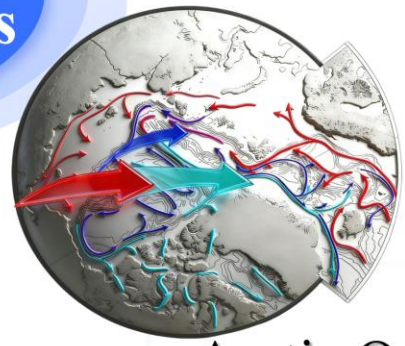


South Ocean

Task

- Ice sheet–ocean interactions
- Shelf-basin exchanges
- Ocean heat and carbon sequestration
- Ecosystems
- South Indian Ocean vs. South Pacific Ocean

Comparison



Arctic Ocean

Task

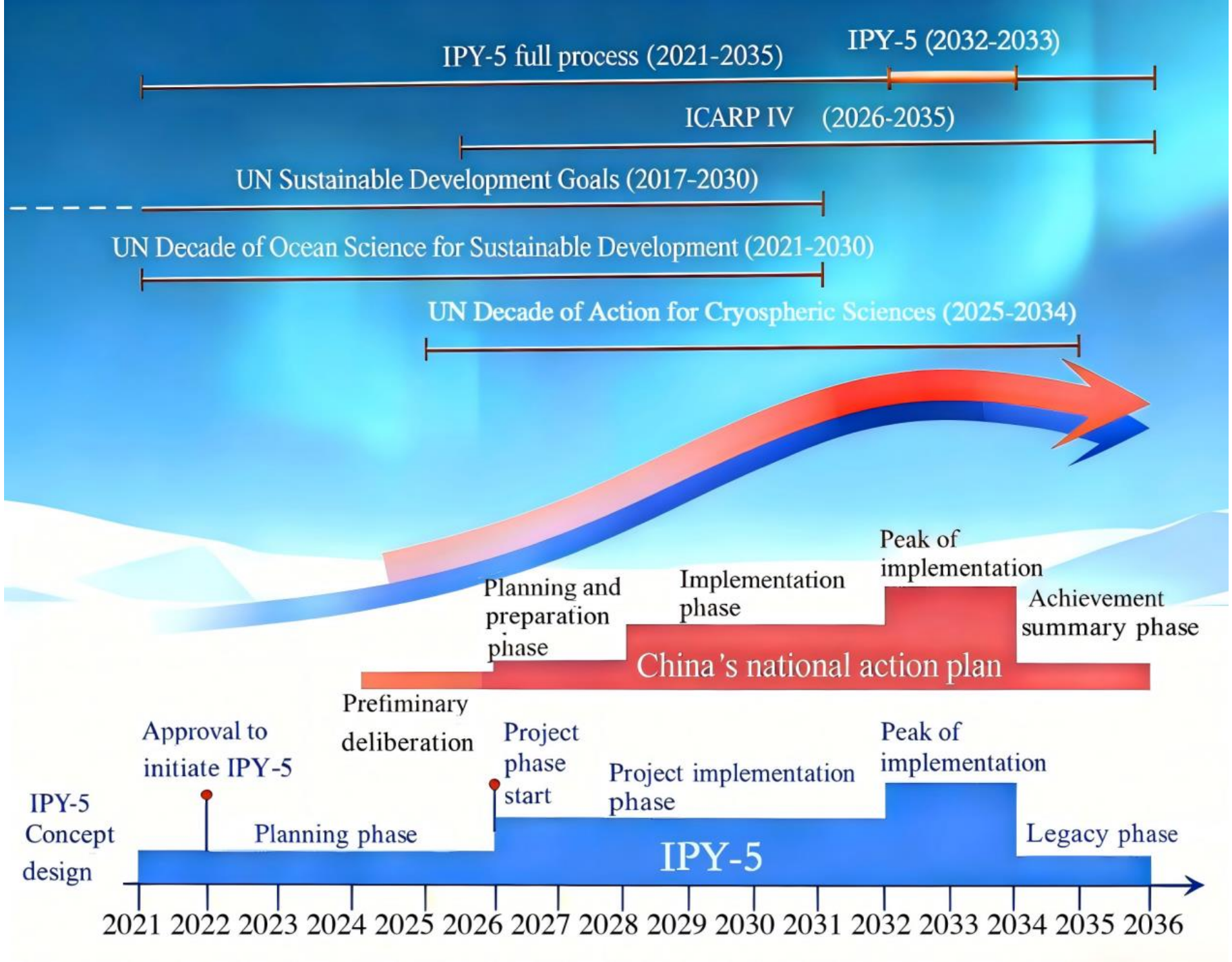
- Shelf-basin exchanges
- Cross-basin transports
- Ecological and climatic effects of sea ice decline
- Shippint and other activities

International cooperation

Task

- IPY international project
- National action plans of other countries
- Polar governance organizations
- Arctic terrestrial regions

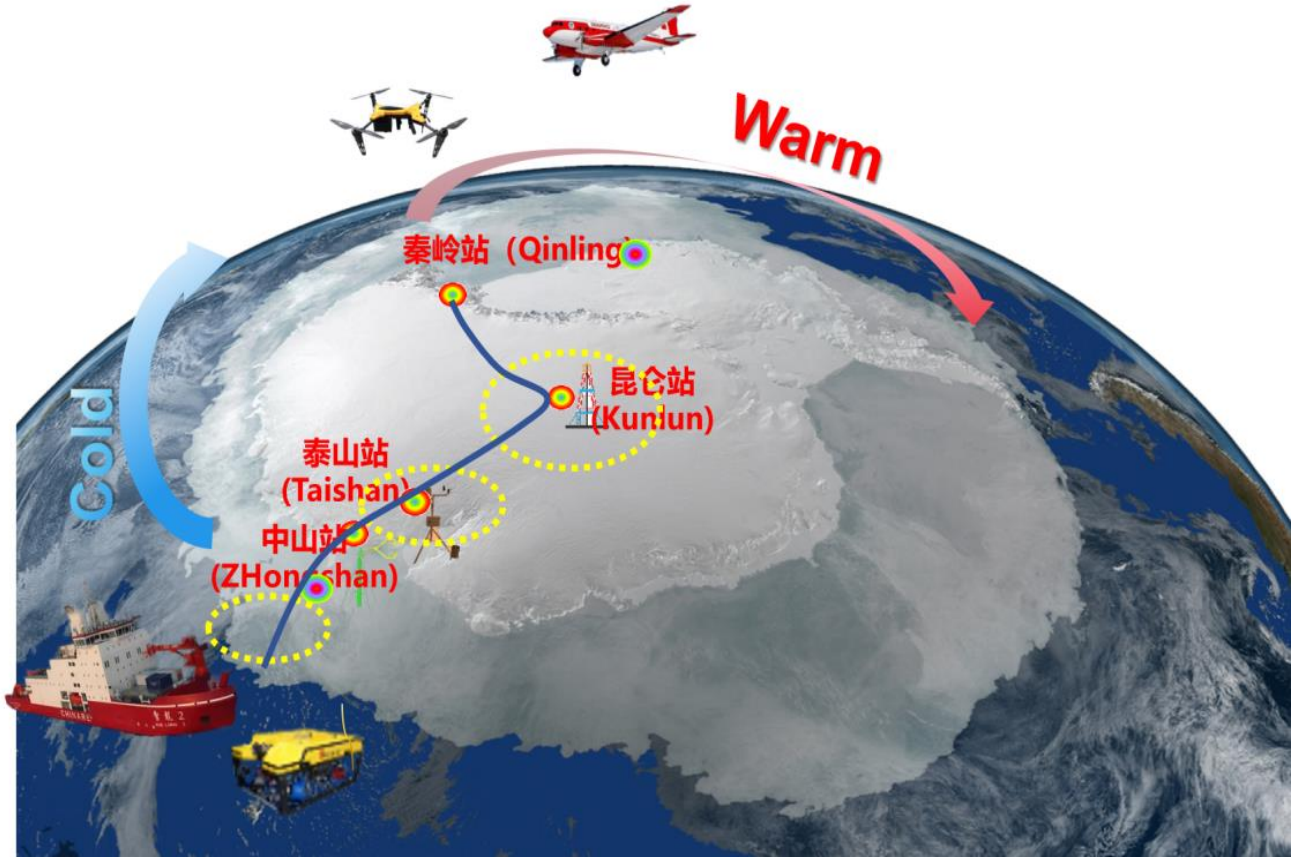
- Data
- Sample
- Outreach
- Education
- Paper
- Assessment
- Product
- Archive
- Standard
- Technology
- Talent
- Prediction capability


IPY-5 full process (2021-2035)
IPY-5 (2032-2033)
ICARP IV (2026-2035)
UN Sustainable Development Goals (2017-2030)
UN Decade of Ocean Science for Sustainable Development (2021-2030)
UN Decade of Action for Cryospheric Sciences (2025-2034)
Planning and preparation phase
Implementation phase
Peak of implementation
Achievement summary phase
China's national action plan
Prefiminary deliberation
Approval to initiate IPY-5
Project phase start
Project implementation phase
Peak of implementation
IPY-5 Concept design
Planning phase
Legacy phase
IPY-5
2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036

■ PANDA-R (Ross Sea or Repetitive work)

Task

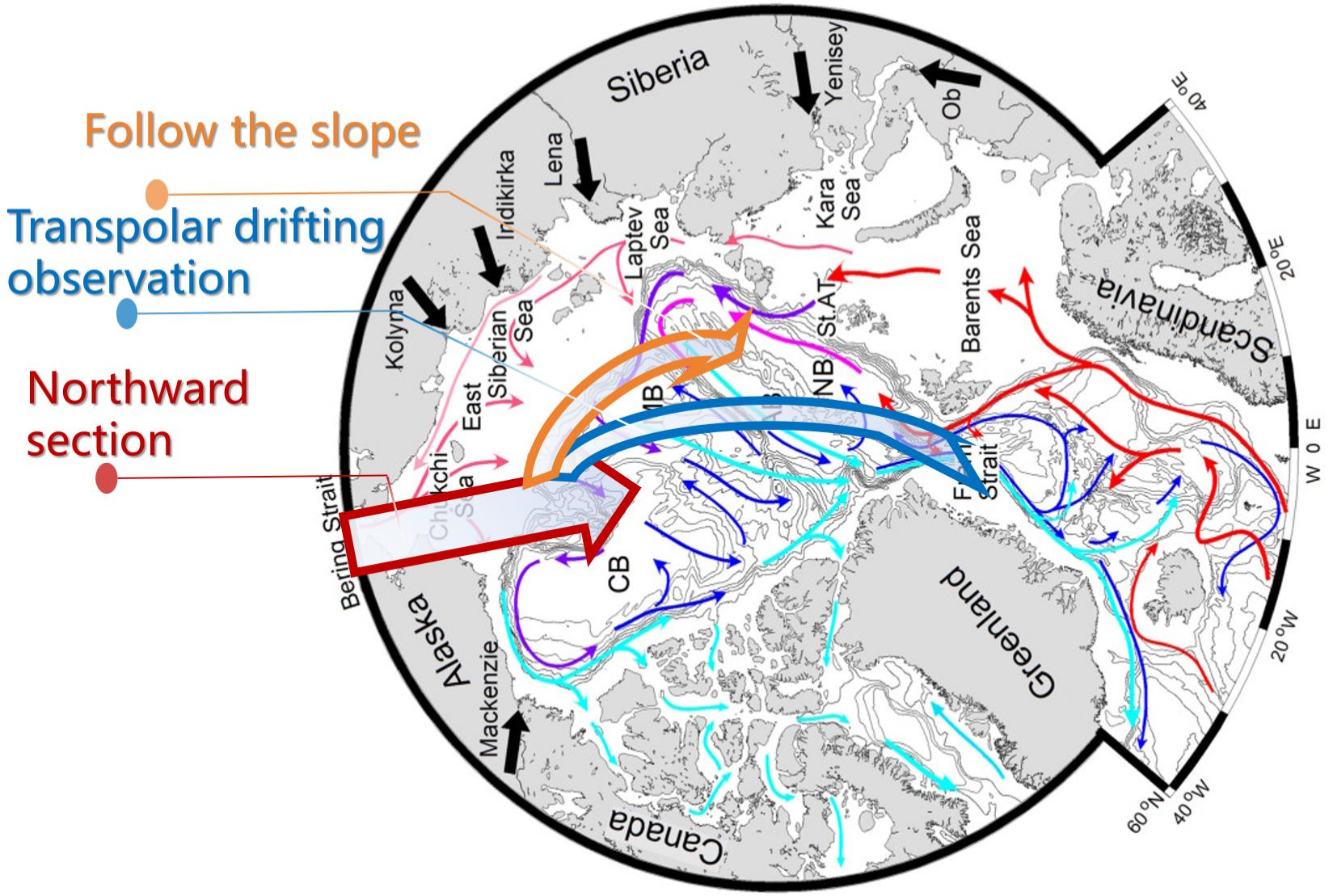
- Prydz Bay-Amery Ice Shelf Interaction
- Grove Mountain
- Zhongshan- Ice Dome A section
- Ice Dome A-Wilkes Subglacial Basin-Qinling Section
- Comparative collaborative observations between Zhongshan and Qinling,
- Ross Sea Ross-Ice Shelf Interaction



■ Arctic Ocean: Documenting New State and Advancing Prediction (Arctic-DNA)

Task

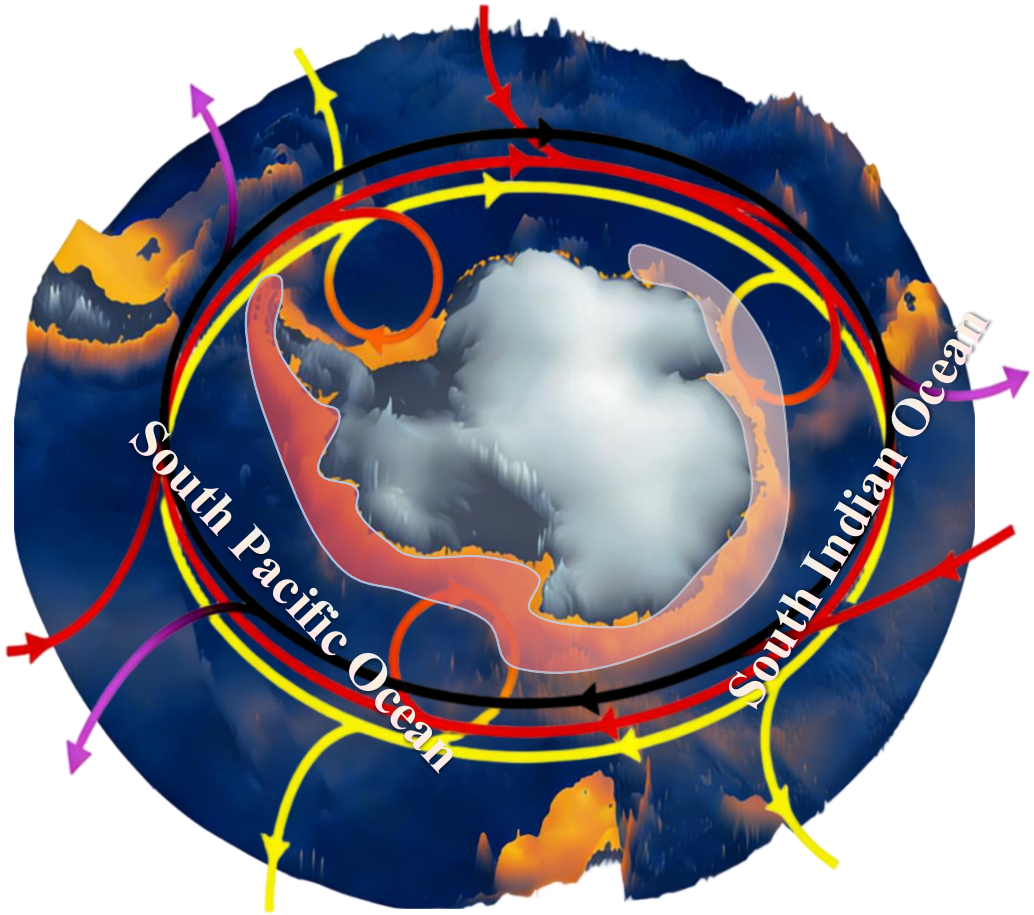
- Cross shelf material and energy transport
- Ecosystems and biodiversity
- Carbon budget
- Pacific and Atlantic inflow water and their range of influence
- Changes in sea ice volume and freshwater budget
- Key Arctic regions affecting weather and climate in Asia



■ Pacific-Indian Sector Comparative Survey in Southern Ocean （PISO)

Task

- Changes in the marine environment of the Southern Ocean and their response and feedback to climate change
- Southern Ocean-Ice Sheet interaction
- Formation of ABW
- Cross shelf transport of material and heat and its impact on carbon sink
- Life processes and evolution of biological resources
- Relationships between the Southern Ocean and the climate and marine environment in mid to low latitudes




Thanks for your attentions