Brazil – a polar country

Seeking cooperation with BRICS institutions

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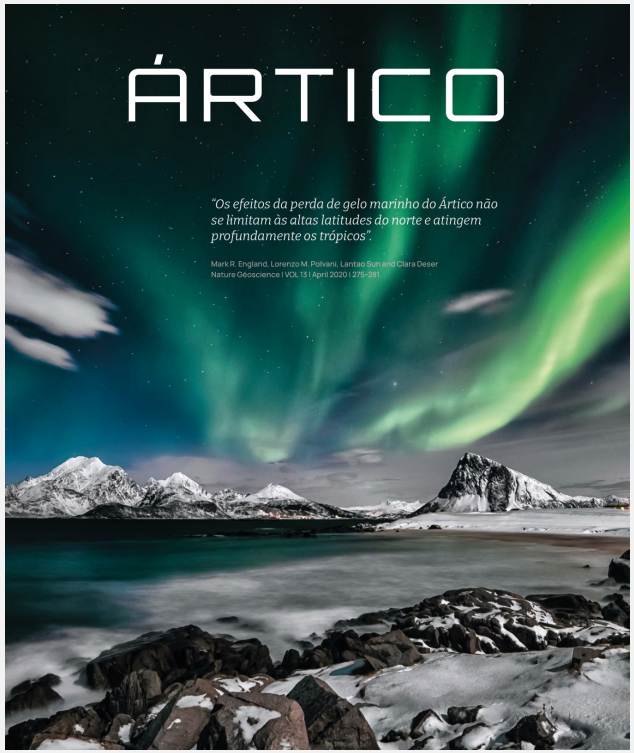

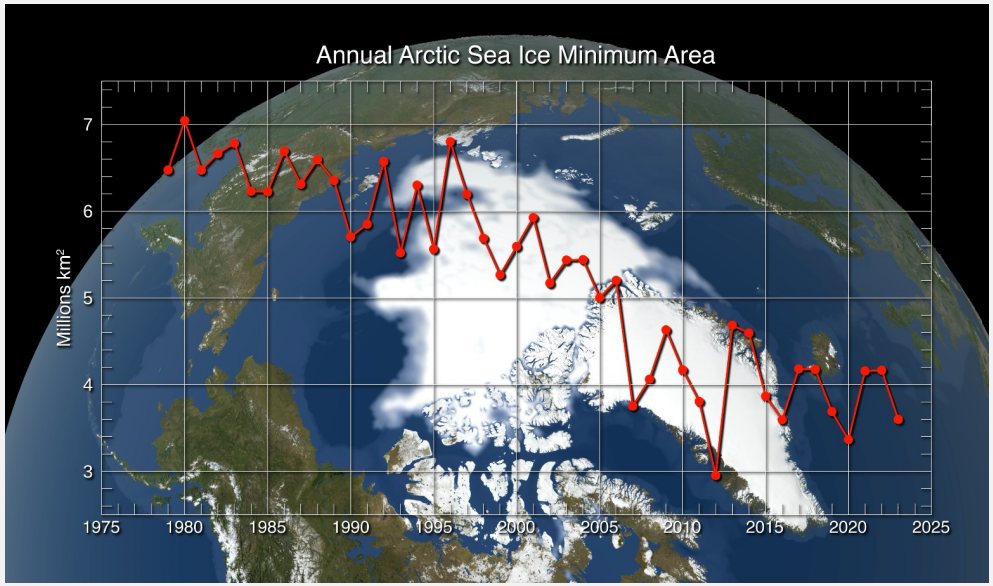

The Arctic

The new frontier of Brazilian science

Brazilian interests

Rapid changes in the Arctic

Rising sea levels

Biodiversity

Mineral resources

New shipping routes

New geopolitical scenario

Environmental preservation and education

CENTRO POLAR E CLIMÁTICO UFRGS

Atmospheric and Oceanic Polar Regions - Tropics connections
or
Could Arctic climate change ripple to the tropics?

- Arctic atmospheric changes could affect **mid and low-latitude weather** (through changes in storm tracks, jet streams and planetary waves), resulting in a southward shift of tropical rain belts.

- Caused particularly by a more meridional atmospheric circulation due to a warmer Arctic

- Natural variability of the Atlantic Meridional Overturning Cell (AMOC), so influencing the climatic variability of the continents of the Atlantic basin.

- Connections Arctic Oscillation - El Niño-Southern Oscillation (ENSO)

- Arctic amplification could be used as an early signal of abrupt climatic change

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1st Brazilian official expedition to the Arctic (Svalbard 2023) + 2024

Exploratory

Mainly sampling of mosses and bryophytes

Future Expanding Brazilian activities in the Arctic

Signing of the Svalbard Treaty

Joint operations in Svalbard (using BRICS' facilities)

2024 Greenland expedition – permafrost studies

The 2024-2025 summer
BRICS Antarctic Coastal Circumnavigation Expedition

AARI Akademik Tryoshnikov

A Brazilian-Russian initiative

Participants

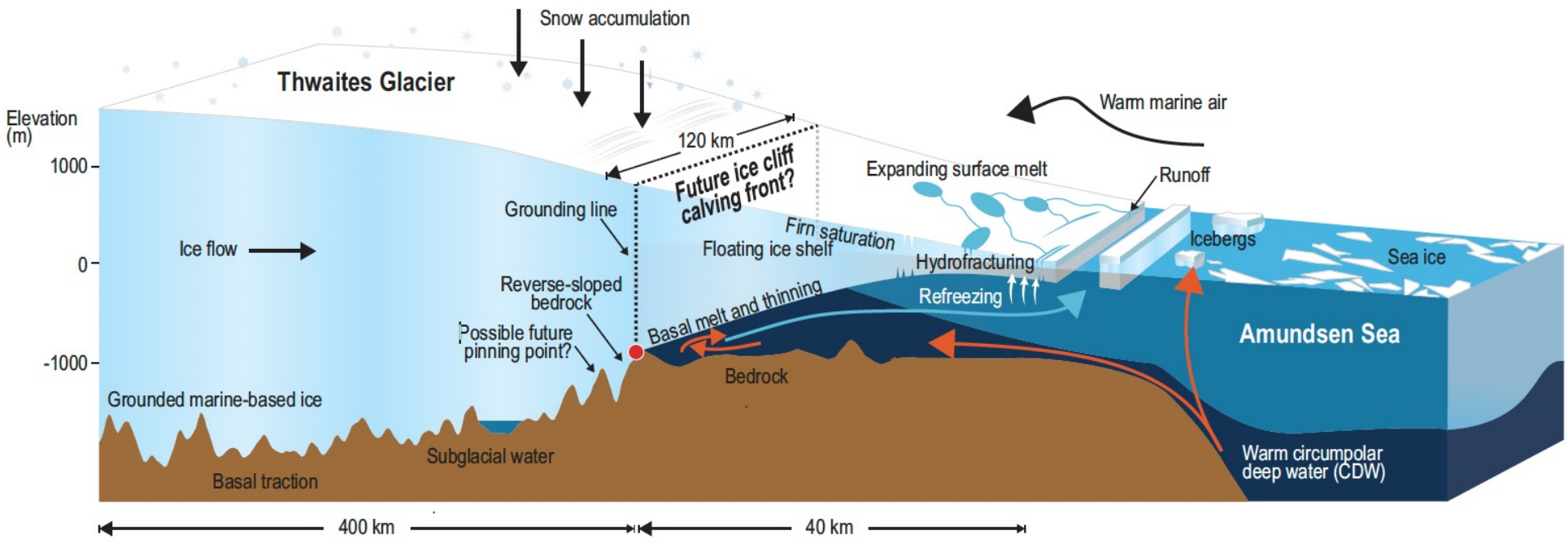
- 57 researchers

Brazil	27 (9 institutions)
Russia	8
China	7
India	7
Argentina	2
Chile	2
Peru	2

Investigations: Glaciology, Marine Geology, Climatology, Paleoclimatology, Atmospheric Chemistry, and Oceanography

Two main areas of research

How dynamically (in)stable are the parts of the ice sheet that have their base below sea level?



Objectives

1- Obtain data on the behaviour of glaciers in response to climate variations, the morphology of the seabed and the resulting sedimentation processes and their impacts. Search for signs of the presence of microplastics in marine and suspended sediments.

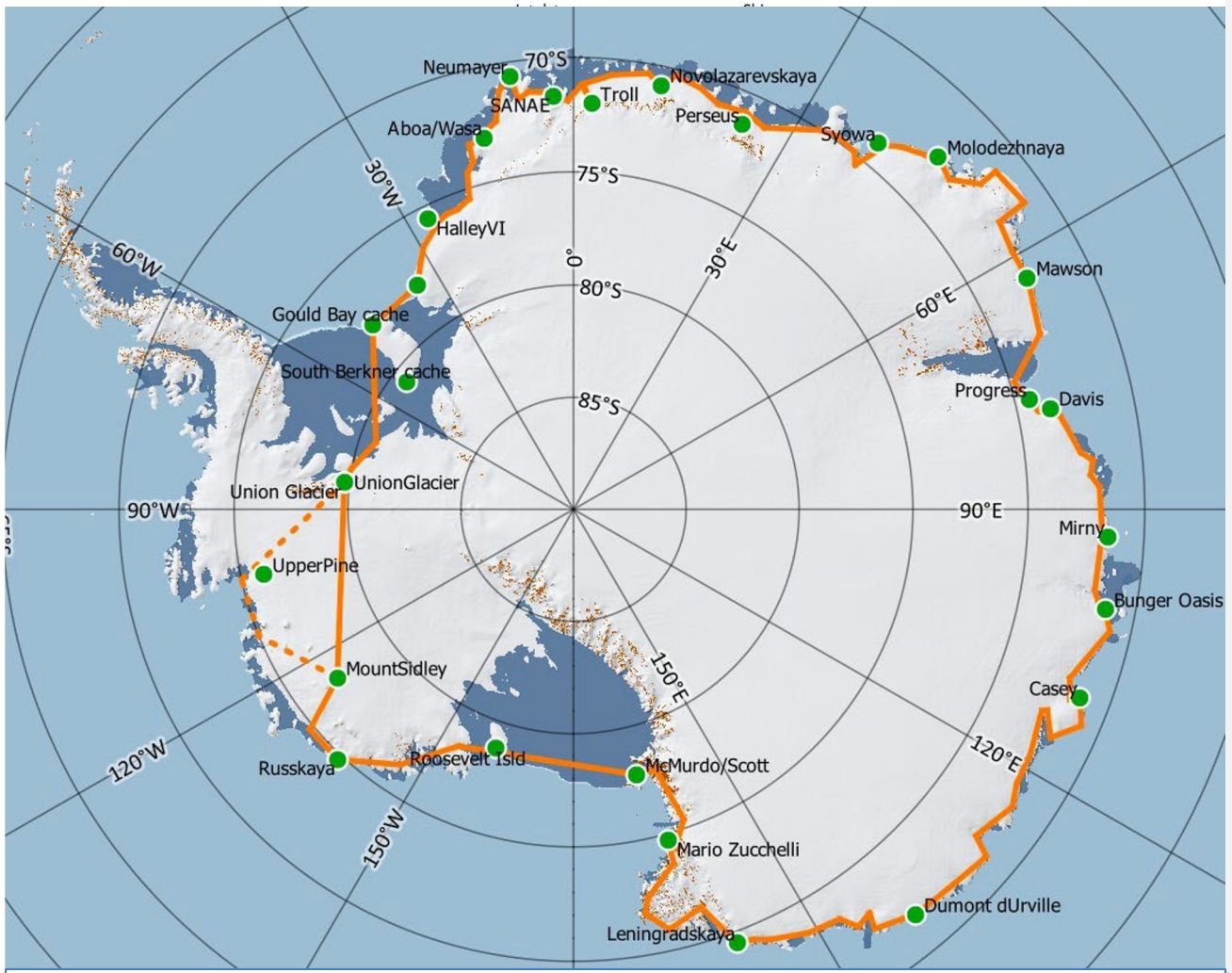
For that:

1) We collected over 90 m of ice cores;

2) Sediment cores (6)

3) We set up 19 stations to determine the temperature, salinity, and acidity of the Southern Ocean at different depths (up to 2,000 m)

Logistical support for the 14,000 km airborne geophysical survey (by radio-echo sounding) of glacier and ice shelf grounding lines



2- Obtain data to study the distribution, dispersion, viability, and survival mechanisms of microorganisms transported via the troposphere in marine bioaerosols, helping to determine pre- and post-depositional selection mechanisms.

Collection of seawater samples to obtain discrete data from the water column to determine: phytoplankton pigments, dissolved inorganic nutrients (nitrite, nitrate, phosphate, and silicate), and the marine carbonate system (total alkalinity, pH, and dissolved inorganic carbon). Also, to determine zooplankton's diversity and biological samples, small nektonic organisms, and predators.

19 stations to determine these data (up to 2,000 m) + continuous sampling of ocean surface data

3- Analyse atmospheric dynamics and thermodynamics at the continent-ocean interface around the Antarctic continent.

Launch of 43 atmospheric balloons (up to 30 km altitude)

BRICS stations visited

Molodezhnaya

Arctic and Antarctic Research Institute / Russian Antarctic Expedition

67°40′00″S 45°51′00″E

Operational period: December–March
Antarctic Environmental Domain:
D – East Antarctic coastal geologic
Antarctic Conservation Biogeographic Region:
5 Enderby Land

Altitude of facility (m)	40
Mean annual wind speed (km/h)	38.16
Mean temperature (coldest month (°C))	–
Total annual precipitation (mm)	270
Area under roof (m²)	7000
Max number of personnel at a time (staff, scientists and others)	15

Novolazarevskaya

Arctic and Antarctic Research Institute / Russian Antarctic Expedition

70°46′00″S 11°50′00″E

Operational period: Year-round
Antarctic Environmental Domain:
T – Inland continental geologic
Antarctic Conservation Biogeographic Region:
7 East Antarctica

Altitude of facility (m)	102
Mean annual wind speed (km/h)	36
Mean temperature (coldest month (°C))	–
Total annual precipitation (mm)	309
Area under roof (m²)	1000
Max number of personnel at a time (staff, scientists and others)	70

Maitri

National Centre for Polar & Ocean Research

70°46′00.6″S 11°43′50.8″E

Operational period: Year-round
Antarctic Environmental Domain:
D – East Antarctic Coastal Geologic
Antarctic Conservation Biogeographic Region:
6 Dronning Maud Land

Altitude of facility (m)	117
Mean annual wind speed (km/h)	31.5
Mean temperature (coldest month (°C))	-16.8
Total annual precipitation (mm)	–
Area under roof (m²)	1030
Max number of personnel at a time (staff, scientists and others)	65

Progress

Arctic and Antarctic Research Institute / Russian Antarctic Expedition

69°23′00″S 76°23′00″E

Operational period: Year-round
Antarctic Environmental Domain:
D – East Antarctic coastal geologic
Antarctic Conservation Biogeographic Region:
7 East Antarctica

Altitude of facility (m)	15
Mean annual wind speed (km/h)	21.6
Mean temperature (coldest month (°C))	–
Total annual precipitation (mm)	213
Area under roof (m²)	1500
Max number of personnel at a time (staff, scientists and others)	50

Zhongshan

Chinese Arctic & Antarctic Administration/ Polar Research Institute of China

69°22′24″S 76°22′40″E

Operational period: Year-round
Antarctic Environmental Domain:
D – East Antarctic coastal geologic
Antarctic Conservation Biogeographic Region:
7 East Antarctica

Altitude of facility (m)	11
Mean annual wind speed (km/h)	22.64
Mean temperature (coldest month (°C))	-19.7
Total annual precipitation (mm)	–
Area under roof (m²)	7436
Max number of personnel at a time (staff, scientists and others)	60

Bharati

National Centre for Polar & Ocean Research

69°24′24.4″S 76°11′42.9″E

Operational period: Year-round
Antarctic Environmental Domain:
D – East Antarctic Coastal Geologic
Antarctic Conservation Biogeographic Region:
7 East Antarctica

Altitude of facility (m)	35
Mean annual wind speed (km/h)	22
Mean temperature (coldest month (°C))	-17.6
Total annual precipitation (mm)	287
Area under roof (m²)	2900
Max number of personnel at a time (staff, scientists and others)	47

Great Wall

Chinese Arctic & Antarctic Administration / Polar Research Institute of China

62°13′3.1″S 58°57′43.2″W

Operational period: Year-round
Antarctic Environmental Domain:
A – Antarctic Peninsula northern geologic
Antarctic Conservation Biogeographic Region:
3 North-west Antarctic Peninsula

Altitude of facility (m)	10
Mean annual wind speed (km/h)	26.64
Mean temperature (coldest month (°C))	-7.6
Total annual precipitation (mm)	1127
Area under roof (m²)	4082
Max number of personnel at a time (staff, scientists and others)	60

Professor Julio Escudero

Chilean Antarctic Program

62°12′57″S 58°57′35″W

Operational period: Year-round
Antarctic Environmental Domain:
G – Antarctic Peninsula offshore island geologic
Antarctic Conservation Biogeographic Region:
3 North-west Antarctic Peninsula

Altitude of facility (m)	10
Mean annual wind speed (km/h)	–
Mean temperature (coldest month (°C))	-6.4
Total annual precipitation (mm)	38.2
Area under roof (m²)	4000
Max number of personnel at a time (staff, scientists and others)	90

Bellingshausen

Arctic and Antarctic Research Institute / Russian Antarctic Expedition

62°12′00″S 58°58′00″W

Operational period: Year-round
Antarctic Environmental Domain:
A – Antarctic Peninsula offshore island geologic
Antarctic Conservation Biogeographic Region:
3 North-west Antarctic Peninsula

Altitude of facility (m)	16
Mean annual wind speed (km/h)	25.56
Mean temperature (coldest month (°C))	–
Total annual precipitation (mm)	729
Area under roof (m²)	1500
Max number of personnel at a time (staff, scientists and others)	40