

MEMBER COUNTRY: CHINA

National Report to SCAR for year: 2009/2010

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SCAR DATABASE						
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A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS:**National SCAR Committee****Title** Chinese Advisory Committee for Polar Research**Address** No.1, Fuxingmenwai Ave., Beijing, 100860, China**Telephone** 86-10-6803 6469**Fax** 86-10-6801 2776**E-mail** chinare@263.net.cn**Chairman/President** Convener: Dengyi Zhang**Representatives: to SCAR**

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Permanent Secretary	Delegate/SCAR Prof. Yang Huigen	451 Jinqiao Road, Shanghai 200129

National Operating Agency

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A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS**1. Introduction**

The 26th Chinese National Antarctic Research Expedition (CHINARE-26, 2009/2010) was composed of 254 personnel, including 67 Chinese scientists. In the early of NOV. 2009, some of the team member flew to Antarctica, and others went there by Chinese vessel "Xuelong". The over-wintering team of CHINARE-25 and the summer team of CHINARE-26 returned to China in the end of March, 2010.

	Great Wall Station		Zhongshan Station	
	Summer Season	Overwintering	Summer Season	Overwintering
Scientists	22	3	14	7
Logistic Personnel	28	10	54	10
Others	106			
TOTAL	267			

2. Stations in Antarctica

Wintering Station

Name	Location	Coordinates
<i>Great Wall</i>	King George Island	62°12'59" S 58°57'52" W
<i>Zhongshan</i>	Larsemann Hills	69°22'24" S 76°22'40" E

3. Main scientific activities

The People's Republic of China

National Programs/Projects by Working Group 2007/2008

Geodesy and Geographic Information

Subject	Investigation	Locality	Duration	Principal Investigator	Add
Surveying	2010 International Epoch GPS Campaign	Great Wall	2009/2010(S)	An Jiachun	1

Physics and Chemistry of the Atmosphere

Subject	Investigation	Locality	Duration	Principal Investigator	Add
Meteorology	Observation	Great Wall	2009/2010	Li Ming	2
AVHRR	Receiving	Great Wall	2009/2010	Li Ming	2
Meteorology	Observation	Zhongshan	2009/2010	Li Kai	2
AVHRR	Receiving	Zhongshan	2009/2010	Li Kai	2
Ozone	Observation	Zhongshan	2009/2010	Li Kai	2
UAP	Recording	Zhongshan	2009/2010	Xing Zanyang	3

Geomagnetism

Subject	Investigation	Locality	Duration	Principal Investigator	Add
Geomagnetism	Recording	Zhongshan	2009/2010	Chang Shoumin	4

Other Programs/Projects

Subject	Investigation	Locality	Duration	Principal Investigator	Add
Traverse	Sampling	Dome A	2009/2010	Li Yuansheng	5

(S)= Summer project only

The list of principal investigators & responsible authorities 2007/2008

1.Mr. Wang Zemin	2.Zhang Lin	3.Mr. Hu Hongqiao	4.Mr. Ning Baiqi	5.Mr. Li Yuansheng
Wuhan University	National Research Center for Marine	Polar Research Institute of China	Institute of Geology and Geophysics	Polar Research Institute of China
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Wuhan City	No.8, Dahuisi Haidian District	Shanghai City	No.11, Datunlujia Rd.	Shanghai City
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Major Progress and Results of Polar Scientific Projects 2007/08

2009 was a remarkable year in the history of China's Antarctic expedition. As a result of tremendous efforts and hard working, the first Chinese inland Antarctic station on the ice sheet--the Kunlun Station was successfully established on Dome A where the elevation is more than 4000 meters above the sea level. It is a great leap forward for China in advancing its Antarctic expedition from the area along the coast to the hinterland area of the Antarctic continent.

With the full-scale implementation of the polar program capacity building projects during the Tenth Five-year Plan, China's capacity in logistic support has been improved greatly; the implementation of China's Action Plan for the International Polar Year has further extended its studying scope in polar scientific research; the active participation in international polar affairs and close cooperation and exchange in scientific research has raised its role and status in international polar community and polar scientific research; visible progress has been made in polar strategic study and the work on planning of the polar scientific research; the in depth polar scientific research has achieved a series of remarkable results; in addition to the above, the public education on polar science has witnessed good effect.

The year of 2009 is the 25th anniversary of China's Antarctic expedition, 20th anniversary of the establishment of the Zhongshan Station, 10th anniversary of China's Arctic expedition, 5th anniversary of the establishment of the Yellow River Station, 20th anniversary of the founding of the China's Polar Research Center, and it is also the 50th anniversary for the Antarctic Treaty to be opened for signature. With so much historic significance, this year has put a great deal of expectation to the progress and success for Chinese polar scientific exploration and research, and the Chinese polar scientists have bravely undertaken such historic responsibilities and carried out a series of Antarctic programs and achieved remarkable progress and success in the year of the 60th anniversary of the founding of the People's Republic of China.

Space Physics

1. Dynamics research on the ionosphere and magnetosphere

Simultaneous observation from multiple earth-synchronous orbit satellites with different local times confirmed that two effects can be caused by sudden increase of solar wind dynamic pressure on the magnetosphere: (a) sharp increase of dayside particle energy flux corresponding to ground geomagnetic sudden commences caused by sudden increase of solar wind dynamic pressure; (b) earthward proton injection on the dawn side about 7 minutes after ground geomagnetic sudden commences occur. The former has been extensively studied, while the latter is obviously different from earthward particle injections that occur during substorms. This study suggests that this phenomenon is due to the acceleration of thermions within the plasma sheet by the east-west electric field transmitting magnetotail-ward that occurs in the magnetosphere when it is under solar wind dynamic pressure.

Effect on the Polar ionosphere of precipitation of electrons of different energy spectrums. Study shows that precipitation of electrons of different energy spectrum distributions does not have much different effects on conductivity of the ionosphere. When energy flux is fixed, average energy is a key factor affecting electrical conductivity; and the energy spectrum has significant effect on concentration of electrons in the F layer. As average energy increases, energy spectrum has more impact on electron concentration. While average energy is above 1KeV, the modified Maxwell distribution spectrum can significantly enhance F layer electron concentration.

2. The aurora characteristics study: Comprehensive research was carried out on dayside aurora based on all-sky aurora observation data obtained at three bands (427.8, 557.7 and 630.0nm) during the past 4 years (2003—2006). It is identified that two peak areas of auroral activity exist in the dayside auroral oval, i.e., an aurora "warm spot" at 09:00MLT and an aurora "hot spot" at 14:00-15:00MLT. In addition, land-based observation shows that the aurora excitation peaks at all three bands are in the afternoon sector, although the excitation peak of each band covers a different MLT sector.

Biology and Life

(1) Classification of strains of psychrophile and cold resistant bacteria living in the Arctic sea ice and sedimentary environment; 3 species of psychrophile were named *Marinobacter psychrophilus* (from sea ice core located at 78° 23'14"N, 149° 06'55"W), *Phaeobacter arcticus* (from the sediment located at 75° 00'24"N, 169° 59'37"W) and *Colwellia polaris* (cold resistant bacteria from sea ice core located at 77° 30'59"N, 152° 52'04").

(2) 338 strains of bacteria from Canadian sea basin were studied for their production of low-temperature enzyme, and their roles in sea ice mass circulation were preliminarily suggested. 71.6%, 65.7%, 38.5%, 31.6% and 16.9% of the bacteria from sea ice could degrade esters, protein, starch, lactose and chitin. Lipase-producing and protease-producing strains play a key role in the mineralization of sea ice organic matters.

(3) Cold metalloproteinases (MCP-02, E495 M4 family) from Arctic sea ice and deep sea strains was compared with temperature Pseudolys in metalloproteinases from land source. It is proposed for the first time that the dynamic optimization of hydrogen is an optimal way for enzymes to adapt to coldness.

(4) Fifty-three strains of actinomycetes from the rhizosphere soil samples around the Yellow River Station were identified to be from 8 genera. Apart from the dominant bacterium *Streptomyces* bacteria, another six rare genera -*Rhodococcus*, *Saccharothrix*, *Rathayibacter*, *Micrococcus*, *Nocardia* and *Kribbella*-were also found.

Oceanography

Carbon cycle monitoring technology in the Southern Ocean and its application.

(1) According to underway nutrients distribution survey made during the 24th Chinese Antarctic Expedition (figure 1), silicate and nitrate content in surface layer sea water shows distinct gradient changes in the polar front area, while the content of chlorophyll-a shows no corresponding change trend

(2) Distribution of the content of copper, cadmium and zinc in the surface layer sea water of Prydz Bay has the following characteristics (figure 3): the content of copper and cadmium in the surface layer of Prydz Bay is much close to that in the Southern Indian Ocean, which may suggest that heavy metals in both marine areas may come from similar sources. The heavy metal content in surface sea water of Prydz Bay is similar to that in the lakes of Larsemann Hills. To some extent it supports Gasparo's "sea spray input" theory. Similarity to the content in marine aerosols might indicate that heavy metals might be involved in the process of air-sea exchanges.