

CLIVAR/CliC/SCAR Southern Ocean Region Panel SORP-10: Sept. 24-25, 2015

National activities report

Country: China

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Date: Sept. 23, 2015

Receipt of material prior to Sept. 22, 2015 will ensure inclusion in meeting discussion. Receipt of material prior to Oct. 15, 2015 will ensure inclusion in meeting report and contribute to future SORP discussions, as well as input to the SOOS and other CLIVAR/CliC/SCAR activities.

Purpose of material gathered for the SORP: To build an overview of
- observational, modeling, state estimation initiatives relevant to the SORP

(This can include a list of activities, maps showing where work has been done, major international project involvement, etc.)

A. Recent and ongoing activities

Does your country have a national committee tasked with oversight of Southern Ocean climate science?

No.

What major activities have been carried out in the last several years or are in progress now? Contact information for the projects would be useful.

1. Observational

In the past 5 years, most Chinese observations in the polar region were supported by the Chinese Polar Environment Comprehensive Investigation and Assessment Programme (2011-2015). Totally 4 cruises have been accomplished by the Chinese National Antarctic Research Expedition (CHINARE) aboard R/V *Xuelong*, CHINARE28(2011/2012)~CHINARE30(2014/2015).

Main observational activities are summarized as following:

• Hydrographic section observation

CTD/LADCP and water samplings were conducted at sections in regions around Prydz Bay (mainly in February of 2013 by CHINARE 29, in February and March of 2015 by CHINARE31, Fig. 1) and South Shetland Islands (in January of 2012 by CHINARE28, in February of 2014 by CHINARE30, Fig. 2). Micro-structure profiler (VMP200) were deployed at parts of these sections.

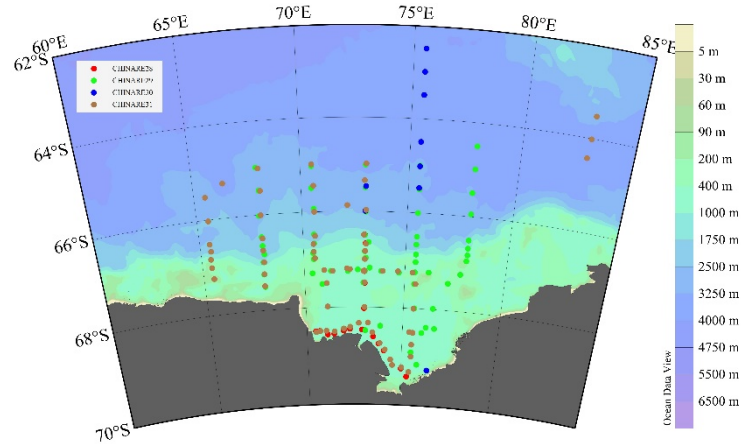


Fig. 1 CTD stations in the region of Prydz Bay

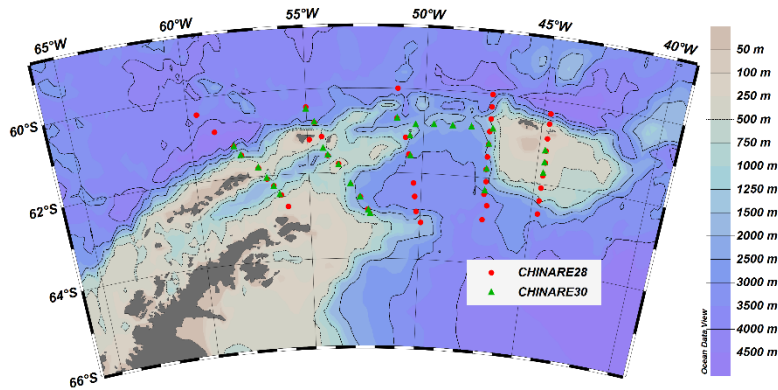


Fig. 2 CTD stations in the region of South Shetland Islands

• **Mooring**

Moorings with CTD, ADCP/current meters were deployed and recovered at several locations in Prydz Bay (Fig. 3). Year-long records have been collected at locations #1 (December 2010~December 2011, February 2014~ February 2015), #2(February 2012~February 2015), #3 (February 2012~February 2013) and #4 (February 2014~February 2015). New moorings were deployed at locations #1, #4 and #5 in February of 2015 and will be recovered in next cruise, around March of 2016.

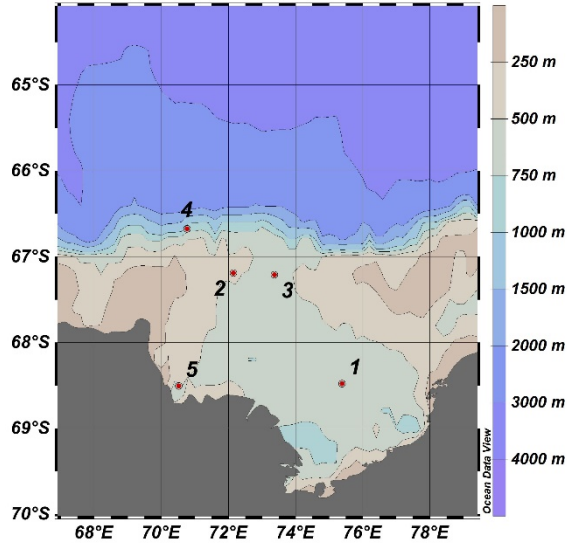


Fig. 3 Mooring locations in the region of Prydz Bay

• **Expendable probes observation**

Expendable probes (XBT/XCTD, radiosonde) were launched at transects between Fremantle - Prydz Bay, Ross Sea/Dumont D'Urville Sea - Hobart/Christchurch (Fig. 4 and 5) and a transect (SR1) in Drake Passage (by CHINARE28 and CHINARE30).

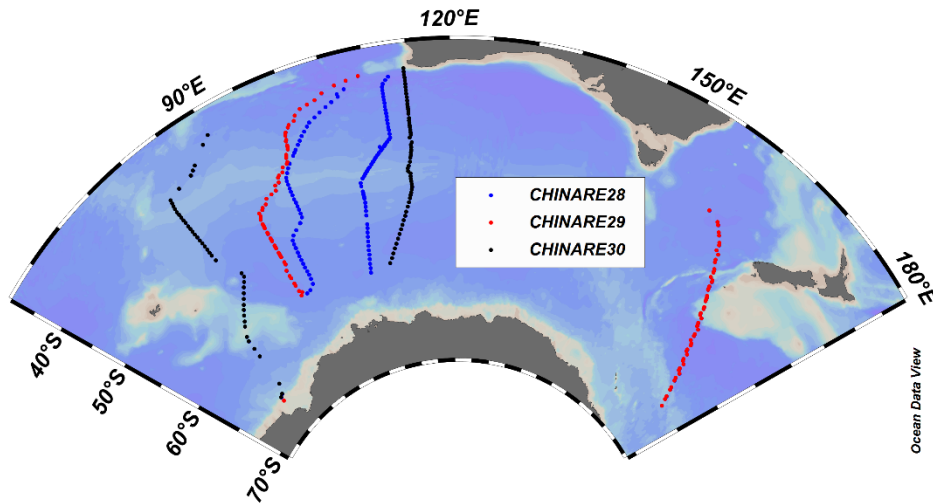


Fig. 4 XBT/XCTD sections between Australia and Antarctica

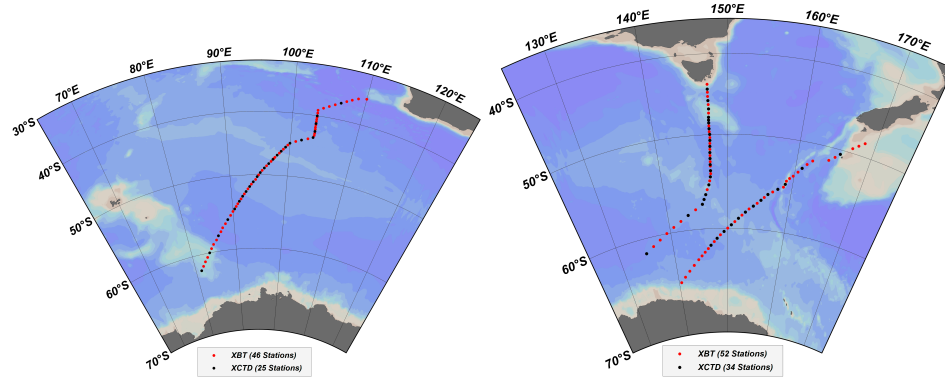


Fig. 5 XBT/XCTD sections between Australia (New Zealand) and Antarctica by CHINARE31 (2014/2015)

• Underway observation

Temperature, salinity and chemistry (CO₂, etc) of sea surface water, meteorology, sea ice (following ASPeCt sea-ice protocol) were measured along ship tracks

Type 1: Indian sector cruise: Fremantle - Prydz Bay - Ross Sea - Hobart/Christchurch, by CHINARE29 and CHINARE31;

Type 2: Circumpolar cruise, Fremantle - Prydz Bay - Ross Sea - South Shetland Islands – Drake Passage – South America – Drake Passage - Prydz Bay – Fremantle, by CHINARE28 and CHINARE30;

Currents in upper ocean were measured by 38kHz/300kHz ADCP in CHINARE31's cruise.

2. Modeling

Massachusetts Institute of Technology General Circulation Model (MITgcm, including sea ice model and ice shelf model) was applied in the region of Prydz Bay and Amery Ice Shelf to set up a high resolution (~1.5) regional numerical model. The products of the European Centre for Medium-Range Weather Forecast 40-yr Re-Analysis (ERA-40) are used as the atmospheric boundary condition. The open eastern, western and northern boundary conditions are given by a cube sphere global experiment similar to the Estimating the Circulation and Climate of the Ocean phase II: high resolution global-ocean and sea-ice data synthesis (ECCO2). The results of this model will give a preliminary comprehension of the seasonal variability of the features of circulation and water masses

3. State estimation

No.

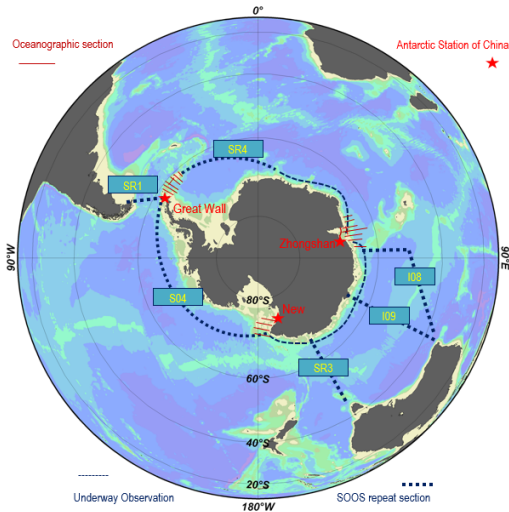
B. Planned activities

What major activities are planned or likely to occur during the next several years? Contact information for the projects would be useful.

1. Observational

The Chinese Polar Environment Comprehensive Investigation and Assessment Programme will be extended more 5 years (2016-2020) but the detailed field work plan is still pending. The likely observing activities include:

- Hydrographic observation at transects in regions around Prydz Bay (February, 2017, 2019), South Shetland Islands (February, 2016, 2018, 2020), and possibly Ross Sea.
- Mooring deployment/recovery in Prydz Bay.
- Underway observations along ship track (Indian sector cruise: Fremantle - Prydz Bay - Ross Sea - Hobart/Christchurch, 2016/2017, 2018/2019; Circumpolar cruise: Fremantle - Prydz Bay - Ross Sea - South Shetland Islands – Drake Passage – South America – Drake Passage - Prydz Bay – Fremantle, 2015/2016, 2017/2018, 2019/2020): current in upper ocean (38kHz/300kHz ADCP), temperature, salinity and chemistry (CO₂, etc) of sea surface water, meteorology, sea ice (ASPeCt).
- Expendable probes (XBT/XCTD, radiosonde) observation at transects: Fremantle - Prydz Bay, Ross Sea - Hobart/Christchurch, Drake Passage.
- Ice Mass Balance Buoy (IMB) on fast ice in Prydz Bay near Zhongshan Station in winter.
- Argo floats and surface drifting floats might be released in the ACC region and Prydz Bay respectively.



Observing sections might be completed by China in future 5 years (2016-2020).
The SOOS repeat sections can be finished only by XBT/XCTD.