Antarctic Observations by China and Its Contribution to YOPP-SH

Qizhen Sun  Qinghua Yang

National Marine Environmental Forecasting Center, China

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sunqizhen@nmefc.gov.cn
Outline

• 1 Routine meteorological observations in Antarctica

• 2 Sea ice observations on coastal fast ice

• 3 Observation with AWSs and UAVs (being planned)
Role of SOA in Chinese Antarctic Expedition

• China has carried out the Antarctic expedition yearly since 1984, and the 34th Chinese Antarctic Expedition will set out in November 2017.

• The State Oceanic Administration (SOA) of China performs the function of organizing Chinese Antarctic expeditions.

• Together with numerous universities and institutes in China, SOA has been playing an active role in the scientific research and international cooperation activities on the Antarctic continent and the Southern Ocean.
1. Routine observations at year-round stations and icebreakers

• The icebreaker XUELONG goes to Antarctica once a year
  • Surface weather observation during cruise
  • ABL sounding (once a day)
  • Data not shared in GTS yet

• A second icebreaker is under construction, available in two years

• Routine meteorological observations at two year-round stations: Zhongshan, Great Wall. Data is shared in GTS.
2. Sea ice observations in Antarctica

- Continuously observation of albedo on costal sea ice, since 2010
- Albedo parameterization contributes to numerical sea ice forecasting

Albedo

Sea ice surface temperature and snow depth
3. Planned observations at new year-round station and AWSs

• At the planned new station at Ross Sea, a comprehensive year-round weather and atmospheric observing system will be established

• Install 13 AWSs in Antarctic continent (100 km interval) during December 2018 - February 2019
Planned ABL sounding by UAVs

- Carry out sounding observation during cruise of icebreakers with UAVs
- Routine sounding observation at year-round stations with UAVs

SUMO: small unmanned meteorological observer

Track of SUMO flights
Assimilation with the UAV (SUMO) sounding dataset

- Assimilation experiment is undergoing
- Significantly improved the local profiles
- Improves the short-term forecast in patterns
Contribution of CHINARE to YOPP-SH

• (1) Promoting the comprehensive weather and sea ice observing, including extensive atmospheric sounding with novel instruments on the cruise of Chinese Expedition

• (2) Establishing multidisciplinary fieldwork and research system in order to carry out long-term research plans. The in situ investigating relies on diverse platforms such as icebreakers, aircraft, and year-round stations.
  1. Routine surface observation from new AWSs and possibly new year-round station
  2. Surface properties, energy and fluxes over sea-ice on coastal Antarctica
  3. Vertical profile of free troposphere: radiosonde and UAVs on the cruise of icebreakers

• (3) Implement of data sharing agreement to promote the international collaboration with regard to Antarctica scientific research and navigation safety.
Connection to YOPP-SH in time phase

CHINARE 2018 with Icebreaker ‘XUELONG’ and stations

November 2018  Core phase of YOPP-SH  February 2019
Finnish Meteorological Institute plans for Southern Hemisphere YOPP

Timo Vihma, Roberta Pirazzini, Tiina Nygård, Bin Cheng et al.

Most of the work will be done in a national project “Antarctic Meteorology and Snow Research: from Process Understanding to Improved Predictions” (ASPIRE), endorsed by YOPP.
WP4 IMPROVED WEATHER AND CLIMATE PREDICTIONS

A. Model evaluation
- basic verification of operational model forecasts
- Model experiments to evaluate the impact of various observations assimilated (in collaboration with NMEFC), probably involving additional radiosonde soundings at Aboa station in Dronning Maud Land (73S, 13W) during the YOPP intensive observation period in December 2018 – January 2019
- evaluation of forecasts for large-scale linkages between Antarctic and southern mid-latitudes

B. Physical parameterizations
- WP1 results for snow albedo → improve the SNICAR model, a component of several climate models
- WP2 results for ABL → new parameterizations for the turbulent fluxes and the gust factor -> implement in Polar WRF, ARPEGE, IFS or JNHM models
- year-long experiments with the old and new parameterization schemes.
- studies on the relative importance of snow-surface coupling, radiative fluxes, and turbulent mixing on the temporal evolution of near-surface variables