

CSTAR and future plans for Dome A

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Abstract. The first set of Chinese Antarctic telescopes at Dome A is called CSTAR. It consists of four 14.5 cm wide-field telescopes and was installed at Dome A during the traverse of 2007/2008. CSTAR successfully operated for 135 days in 2008 and for more than 200 days in 2009. This paper briefly introduces recent developments in Chinese Antarctic astronomy and their international collaborative activities. It also describes future plans for Dome A, as the building of Kunlun Station began in January of this year.

Keywords. Antarctica, Telescopes, Site Testing.

1. Introduction

In 2004, a Chinese traverse team led by Yuansheng Li, the senior researcher of the Polar Research Institute of China (PRIC), reached Dome A, from Zhongshan Station. Shortly following this event, the first time humans had ever been to Dome A, Lifan Wang & Xiangqun Cui, with the collaboration of the LAMOST project, organised a workshop on “Wide Field Survey Telescopes at Dome C/A” in Beijing between 3 to 4 June of 2005. This workshop started Chinese astronomical activities and the international collaboration at Dome A. In June 28, 2005, organised by Jun Yan, Lifan Wang and Xiangqun Cui, a further meeting on “Antarctic Astronomy at Dome A” was held at Purple Mountain Observatory (PMO) in Nanjing. In November 2005, the meeting “Wide Field Astronomy on the Antarctic Plateau” was organised by Lifan Wang & Enrico Cappellaro in Padua, Italy. Through the efforts of Jun Yan, Xiangqun Cui, Longlong Feng & Lifan Wang, the Chinese astronomical community joined the PANDA project, which was a Chinese Key international program for the IPY between 2007 to 2010. A MoU between USNW–NAOC–PRIC was signed for collaborations on Antarctic astronomical research in December 2006. This includes the international collaboration on site testing of Dome A with Texas A & M University, USA, University of New South Wales, Australia, California Institute of Technology, USA, Solar Mobility, Australia, Thirty Meter Telescope Project, USA, University of Arizona, USA and the University of Chicago, USA. In addition to these activities, the Chinese Center for Antarctic Astronomy (CCAA) was established on December 24, 2006 in PMO, including the member institutes of Purple Mountain Observatory (PMO), Nanjing Institute of Astronomical Optics & Technology (NIAOT), National Astronomical Observatories (NAOC), Polar Research Institute of China (PRIC), Institute of High Energy Physics (IHEP), Shanghai Astronomical Observatory (SAO), Nanjing University, Tianjin Normal University and the Institute of Electronic Engineering.

Since then, in early 2007 building of the Chinese Small Telescope Array (CSTAR), which consists of 4×14.5 cm wide field telescopes, began in China, and the international collaboration on site survey instruments using the PLATO laboratory started. In the

2007/2008 traverse CSTAR and PLATO were successfully installed and operated (including the site survey instruments SNODAR, GATTINI, Sonics & Pre-HEAT) by Dr. Xu Zhou and Dr. Zhenxi Zhu. In the 2008/2009 traverse Dr. Xuefei Gong successfully maintained these instruments. The Chinese Kunlun Base Station at Dome A was also established. By January 27, 2009 236 square meters of the main building had been built for Kunlun Station. The complete building will be constructed next summer, during the 2009/2010 traverse.

2. CSTAR

CSTAR consists of four 14.5 cm small telescopes with a 20 sq deg FOV (4.5×4.5 degrees) and $1k \times 1k$ frame transfer CCD for each, and with g, r, i filters and unfiltered respectively. The image quality is 90% of the light energy circled in 2 pixels. A fixed observing direction of the South Pole area was adopted for these pioneering observations.

The scientific purposes of CSTAR are to: (1) measure atmospheric extinction, (2) measure sky brightness, (3) search for variable stars, (4) search for transiting exo-planets and to (5) find bright SNe, Novae or afterglows of GRBs.

After 135 days observation with 20 seconds exposure time for each image, 271,041 good frames were obtained. Some results have been obtained from the data processing will be published soon.

See references Cui, *et al.* (2008), Gong, *et al.* (2008), Kulesa, *et al.* (2008), Lawrence, *et al.* (2008), Lawrence, *et al.* (2008), Tothill, *et al.* (2008), Yang, *et al.* (2009) and Yuan, *et al.* (2008) for papers describing Chinese activities at Dome A.

3. Future Plans for Dome A

2008-2010:

- Continue site survey and astronomical observations
- Upgrade PLATO and CSTAR
- Develop and operate a Fourier Transform Spectrometer (FTS)
- Develop and operate 3 \times 50cm/70cm modified Schmidt telescopes (AST3)

2011-2015:

- Continue operation of FTS and AST3
- Develop and operate a 1m Optical/Infrared telescope
- Develop and operate a 5m Sub-mm/THz telescope

2012-2020:

- Develop and operate a 4m wide field Optical/Infrared telescope
- Develop and operate a 15m Sub-mm/THz telescope

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