

# China aims high from the bottom of the world

Country plans two world-class telescopes for its Antarctic observatory.

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29 August 2012

Chinese astronomers last week unveiled an ambitious plan for an observatory at Dome A — the highest point on the Antarctic plateau (see [map](#)) — at the International Astronomical Union’s twenty-eighth general assembly in Beijing.

The plan includes two telescopes, says Yang Ji, director of the Chinese Academy of Sciences’ Purple Mountain Observatory in Nanjing, who is leading the effort to build the Dome A observatory.

The Kunlun Dark Universe Telescope (KDUST) will be a 2.5-metre survey telescope designed to use optical and near-infrared light to detect Earth-like planets outside our Solar System and to probe dark matter and how the Universe’s first stars formed.

The Dome A Terahertz Explorer-5 (DATE5) will be a 5-metre telescope that would detect light with longer wavelengths, allowing astronomers to see into the dark clouds of dust and molecules where stars are forming.

The pair “would be among the biggest and most significant telescopes in Antarctica,” says Michael Ashley, an astronomer at the University of New South Wales in Sydney, Australia. “There is almost an unlimited amount of science you can do with them.” The only other telescope on the continent that comes close is the South Pole Telescope at the Amundsen-Scott South Pole Station.

KDUST and DATE5, with a combined budget of more than ¥1 billion (US\$157 million), will join a growing number of instruments and telescopes at China’s Kunlun station on Dome A.

## The last frontier

Astronomers have long suspected that Dome A may be the best place on Earth to gaze at the Universe, says Lifan Wang, an astronomer at Texas A&M University in College Station, and director of the Chinese Centre for Antarctic Astronomy in Nanjing.

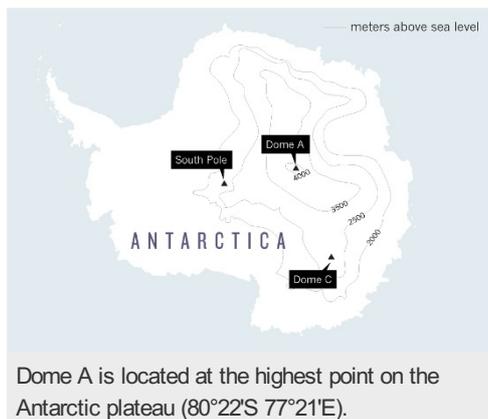
At 4,093 metres above sea level, Dome A has an extremely thin and stable atmosphere, and the pressure is only half that at sea level. The extreme cold — temperatures can drop to  $-80\text{ }^{\circ}\text{C}$  — makes the air very dry and reduces background radiation when observing in the infrared. There is almost no air pollution and the long winter nights allow for four months of uninterrupted observation.

Since early 2008, astronomers from China, Australia, the United Kingdom and the United States have been testing Dome A’s observing conditions using instruments on an automatic observatory called PLATO.



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The PLATO observatory has confirmed that “the seeing is very good” from Antarctica’s Dome A.



The results have met all expectations, the researchers say. Images obtained so far from the four 14.5-centimetre optical telescopes comprising the Chinese Small Telescope Array (CSTAR) and the first of a trio of 50-centimetre Antarctic Survey Telescopes (AST3) have confirmed that “the seeing is extremely good,” says Wang. “We have discovered many new variable stars, and can observe stars that [the NASA space observatory] Kepler cannot observe.”

In the next few years, the researchers will continue to test observing conditions at Dome A, especially in the infrared. They are building infrared instruments to test the sky background and to measure the amount of information that is lost owing to collisions between atmospheric molecules.

The researchers expect major findings from AST3, which is designed to look for planets outside the Solar System, planetary transits

and supernova explosions caused by the death of massive stars. The first AST3 telescope, installed in January, has obtained 28,500 images and 3.3 terabytes of data, says Wang. The other two will make their way to Dome A between late 2013 and 2015.

Meanwhile, astronomers are pinning big hopes on KDUST and DATE5, which are expected to be operational by 2020. The telescopes “are guaranteed to make numerous groundbreaking discoveries”, says Ashley.

*Nature* | doi:10.1038/nature.2012.11291