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## CHINESE DOME A TRAVERSE IN 2004/2005 SEASON, ANTARCTICA

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The Dome A region is the highest plateau of the Antarctic ice sheet, and the coldest place on the Earth's surface. The summit of Dome A is a little known region of the Antarctica, and as it is the highest part of the Antarctic ice sheet, it will be an ideal place for observing the earth's environmental background and making new scientific findings in a range of disciplines. The transect from Zhongshan-Lambert Glacier Basin-Dome A is a very important region for understanding east Antarctic mass balance and climate change.

The Chinese Dome A Survey Program started in 1996, and four inland traverses have been made from 1996 to 2005. The 2004/05 traverse commenced on 12th December 2004, and was two months in the field, including a 2 week stay at the summit of Dome A. To determine the summit of Dome A we first used satellite altimetry data provided by colleagues in Australia, UK and China, and then surveyed a small region in the field by GPS to find the highest point. This technique was similar to that used by Japanese glaciologists to locate Dome F.

The following scientific activities were carried out during the traverse:

1. The ice thickness and sub glacial topography were measured by ice -penetrating radar both along the traverse route and in the region of the summit of Dome A. The ice thickness at the summit of Dome A was measured as over 3000 m (pers. comm., Dr. Sun Bo). The oldest ice in Antarctica may be found there and it is hence a potential site to reconstruct a 1.2M year record of past climate and environment.
2. Two automatic weather stations were installed at the summit of Dome A and at mid-point of the route from Zhongshan to Dome A (named Eagle). Their locations are 80.3667 S, 77.3531 E, 4093m for Dome A, and 76.4175 S, 77.0297, 2824m for Eagle. We have obtained a complete year of data, including snow accumulation, from these two stations.
3. The site of the summit of Dome A was determined by differential GPS. It is located at 80,22,00 S; 77,00,11 E, and the height is 4093m.
4. A 108m shallow ice core was obtained from the summit of Dome A. It could contain a record of the past 3,000 years' climate.
5. A network of canes for mass balance observation was set up from LGB72 to the summit of Dome A at 2km intervals. Surface snow samples and surface snow temperature were collected and measured on the route from Zhongshan to Dome A every 10km. The 10m depth snow temperature measured at the summit of Dome A is -58.4 C. It could be a lowest annual mean temperature on the Earth's surface.
6. More than 10 high resolution GPS measurement points were set up on the traverse route.
7. The topography of some parts of the Gamburtsev sub glacial mountain was measured by ice penetrating radar.

Snow at the summit of Dome A deposits mostly from small crystal ice which is floating in the air and very soft hoar frost sublimation direct from water vapor. The soft layer of the surface snow is about 20cm. Low wind speed, low temperature and low air pressure are typical at the summit of Dome A. There is no drifting snow and the surface is very flat.

With its extreme cold, dryness, flat surface and low wind speed, the Dome A area provides the best site on the Earth's surface for the conduct of a wide range of astronomical observations, from optical to millimetre wavelengths. Study of the unexplored Gamburtsev sub-glacial mountains beneath Dome A may contribute greatly to theoretical earth science and to understanding the geological history of Antarctica. Observatories along the

Zhongshan-Dome A transect will be important for studying ice dynamic and mass balance processes, recent climate history and SolarWind/Magnetosphere/Ionosphere coupling.