The PLATO remote observatory for the Antarctic plateau

M.C.B. Ashley (1), G. Allen (2), C. Bonner (2), S. Bradley (3), X. Cui (4), J.R. Everett (1), L. Feng (5), X. Gong (4), S. Hengst (1), J.Hu (6), Z. Jiang (6), C.A. Kulesa (7), J.S. Lawrence (1), Y. Li (8), D. Luong-Van (1), A.M. Moore (9), C. Pennypacker (11), W. Qin (8), R. Riddle (10), Z. Shang (12), J.W.V. Storey (1), B. Sun (8), N. Suntzeff (13), N.F.H. Tothill (14), T. Travouillon (9), C.K. Walker (7), L. Wang (5,13), J. Yan (5,6), J. Yang (5), H. Yang (8), D. York (15), X. Yuan (4), X. Zhang (5), Z. Zhang (8), X. Zhou (6), Z. Zhu (5)

(1) University of New South Wales, Australia, (2) Solar Mobility, Australia, (3) University of Auckland, New Zealand, (4) Nanjing Institute of Astronomical Optics Technology, China, (5) Purple Mountain Observatory, China, (6) National Astronomical Observatory of China, China, (7) University of Arizona, USA, (8) Polar Research Institute of China, China, (9) California Institute of Technology, USA (m.ashley@unsw.edu.au)

PLATO is a self-contained automated platform for conducting year-long, completely robotic, experiments from the Antarctic plateau.

PLATO was originally motivated by a desire to measure the site conditions that are relevant for future astronomical observatories in Antarctica. PLATO was designed and built at the University of New South Wales, and deployed to Dome A in Antarctica by a 1300km Chinese traverse from Zhongshan station in January 2008.

Since 27 January 2008 PLATO has been running remotely at Dome A, under Iridium satellite control, with the aim of taking data until the traverse returns one year later. At the time of writing, PLATO has been operating for three weeks and all instruments are working.

PLATO consists of two modules built using 10-foot shipping containers. The Engine Module contains six Hatz diesel engines running on 4000 litres of Antarctic blend Jet-

A1. The Instrument Module is 45m away and contains the computer systems, battery bank, power supplies, web cameras, and some of the science instruments. Solar panels and other instruments are external to both modules. The modules are thermally insulated, and require a delta heat input of only 15W to change their temperature by 1K, thereby allowing the internal temperature to be 50 degrees or more above ambient.

The two modules are linked by a 120VDC cable distributing approximately 1kW of electrical power. A CAN (Controller Area Network) bus is used to control both modules. Two banks of ultracapacitors provide power to the starter motors for the engines. Only one engine is normally run at a time. Solar panels supply an additional kilowatt of electricity during the summer time.

The PLATO computer system is based on two redundant PC/104 systems, each with an Iridium satellite modem for remote control, and with the capability of transmitting up to 20MB of science data per day. The computers boot from USB flash disks tested for low temperature performance. A readonly filesystem is used for the Debian GNU/Linux operating system to maximise reliability.