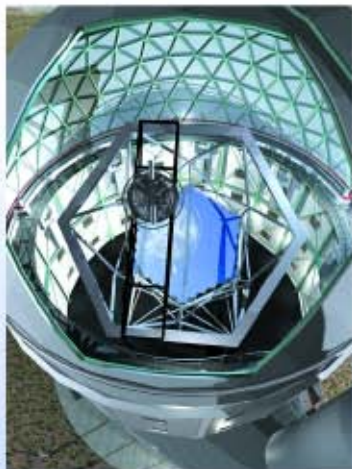




science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



Spectacular SCIENCE on African soil

NOVEMBER 2005

What is SALT?

The Southern African Large Telescope (SALT) is the largest single optical telescope in the southern hemisphere, and equal to the largest in the world. It is also one of the biggest science projects of South Africa's new democratic government. Through a combination of skill, dedication, political support and international collaboration, it took only five years to build this magnificent telescope. It proves that frontier science can be done in Africa.

Where is it?

SALT is about 370 km from Cape Town, just outside Sutherland, a small town in South Africa's Northern Cape Province. The telescope is 1800 m above sea level, at 32.3794°S, 20.8106°E.

Why was it built there?

- ✦ It is far from any major city or town in one of the darkest regions of the world.
- ✦ Light pollution is a serious problem for optical observatories.
- ✦ A dry climate with relatively low cloud cover throughout the year ensures excellent observing conditions.
- ✦ SALT is the only large telescope observing the southern hemisphere night sky when it is day in South America and Chile.

How much did it cost?

The total cost of building the telescope has been kept within the original estimate of US \$20 million defined in 1998, even before the final designs were completed. This is about a fifth of the normal cost of a telescope this size. The instruments cost another US \$6 million, and it will cost US \$10 million to operate SALT over its first 10 years. South Africa contributed about a third of the total cost, with the rest coming from partners in Germany, New Zealand, Poland, the UK and the USA.

Who built the telescope?

Kobus Meiring headed the SALT project team, with David Buckley as the project scientist, and Darragh O'Donoghue as the optics specialist. About two thirds (by value) of the contracts for construction and components were awarded to South African companies. The SALT Board, representing all partners, guided the process in collaboration with the South African Astronomical Observatory (SAAO).

The telescope and its instruments

- ✦ SALT's light gathering surface (or primary mirror) consists of 91 hexagonal mirrors in an array 11 m across. A sophisticated optical alignment system allows them to work as a single giant precision mirror.
- ✦ A sophisticated digital camera, known as SALTICAM, records images of astronomical objects.
- ✦ The 100-tonne telescope prepares for each observation by lifting itself on air pads (like a giant hovercraft), then rotating into position. High above the telescope the 5-tonne moving tracker assembly follows the stars as the earth rotates, keeping itself dynamically positioned and tilted within a few millionths of a metre.
- ✦ The Robert Stobie Spectrograph, mounted with SALTICAM on the moving tracker assembly high above the mirror, will allow astronomers to dissect and analyse the dim light of distant stars and galaxies in dozens of different ways, some of them not available on any other large telescope. The spectrograph is named after Dr Robert Stobie, the former director of SAAO, who played a leading role in SALT until his untimely death in 2002.

What will SALT see?

With its 11 metre mirror, 'Africa's Giant Eye' is powerful enough to record distant stars, galaxies and quasars a billion times too faint to see with the unaided eye. Powerful instruments will dissect and analyse the light, allowing astronomers to study the birth of the earliest galaxies and stars, to follow the life cycles and motions of stars in neighbouring galaxies and in our own Milky Way, and to probe the nature of violent exotic processes in exploding stars, gamma ray bursters and black holes, as well as search for planets around distant suns. The finest details observed by SALT may be as small as a R2 coin 5 km away.

SALT's debut

On 1 September 2005, exactly five years after groundbreaking, SALT astronomers officially announced "first light" and released the first colour images to demonstrate the sheer light gathering power of the telescope. They show old and young clusters of stars, regions where glowing gas clouds surround newly formed stars, and a spiral galaxy similar to our own Milky Way, but located 30 million light years away in the constellation of the Peacock. Although months of fine-tuning still lie ahead, SALT is now coming 'online'.

Using SALT – the information age telescope

All the SALT partners will get time on the telescope – proportional to their shares in the building and operating costs. Partnership astronomers won't travel to Sutherland. Their observing requests from around the globe will come to Sutherland via the Internet, where dedicated SALT operations staff will then make the observations and send the data back electronically.

Who are the SALT partners?

The SALT partner institutes span six countries and four continents in a broad international partnership: The partners are: • The National Research Foundation of South Africa • Nicolaus Copernicus Astronomical Centre of the Polish Academy of Sciences and a consortium of three Polish universities, comprising: Jagiellonian University, Nicolaus Copernicus University, and Adam Mickiewicz University • The Hobby-Eberly Telescope Board (representing Georg-August-Universität Göttingen, Ludwig-Maximilians-Universität München, Stanford University, the Pennsylvania State University, and the University of Texas at Austin) • Rutgers, the State University of New Jersey (USA) • Georg-August-Universität Göttingen (Germany) • University of Wisconsin-Madison (USA) • University of Canterbury (New Zealand) • University of North Carolina-Chapel Hill (USA) • Dartmouth College (USA) • Carnegie Mellon University (USA);

• United Kingdom SALT Consortium (UKSC), comprising: the Armagh Observatory, the University of Keele, the University of Central Lancashire, the University of Nottingham, the Open University and the University of Southampton.

Bringing the stars home to Africa

SALT is more than just a spectacular tool for scientists to explore the universe and extend human knowledge. A tangible beginning for a new generation of scientists has been provided as SALT Foundation partners have sponsored bursaries and scholarships for South African students studying both here and abroad. At school level, SALT has already catalysed science education initiatives, and many more are foreseen. SALT, like the science it will produce, has the gift of sparking the imagination. Young visitors to SALT, youth encountering SALT in the media or in the classroom, and the lucky science and engineering students who work with SALT directly, will all know that cutting-edge science can happen in southern Africa.

Twinned with Texas

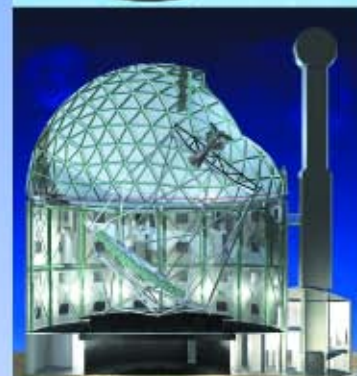
Much of the original design concept for SALT was modelled on the Hobby-Eberly Telescope in Texas, giving a useful starting point and allowing SALT's engineers to make creative use of their 'lessons learned'. This helped enormously in completing the telescope on time and within budget.

Where did it all start?

The area outside Sutherland has been home to telescopes of the SAAO since the early 1970s. Local astronomers realised at least as early as the 1990s that South Africa would be excluded from much cutting edge research without a major new telescope, and started lobbying decision makers for support.

Major milestones in SALT's history:

- ✦ **June 1998:** South African government announces its commitment to provide R50 million to build the single largest telescope in the southern hemisphere.
- ✦ **June 1999:** Announcement that research institutes and universities in Poland, Germany and the USA would buy a R40 million share in SALT. (Other partners followed later.)
- ✦ **September 2000:** A few hundred spectators and dignitaries gather near Sutherland to break the ground for SALT construction.
- ✦ **September 2005:** Announcement of SALT first light.
- ✦ **10 November 2005:** Official inauguration of the telescope by South Africa's President Thabo Mbeki.



Where can I get more information?

www.salt.ac.za and www.saa0.ac.za
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as a contribution to Astronomy Month 2005

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