

**Article Category: Project Parade**

# SALT

*Lene Ecoignard*

Recently the South African government approved construction of the Southern African Large Telescope (SALT). This is a very exciting project that will run for five more years and promises significant technology and skills development for the country. Says Dr Robert Stobie, Director, South African Astronomical Observatory (SAAO), “With the construction of SALT, South African scientists will be able to match or exceed the astronomical resources in South America and Australia for the first time in decades”.

## **Largest telescope in the world**

The plan is to construct a Southern Hemisphere twin for the Hobby-Eberly Telescope (HET) in Texas. This would give SA access to the most powerful optical infrared telescope south of the equator. The largest telescope in the world is the Keck telescope at Mauna Kea, Hawaii USA. The rationale behind SALT is not to build a telescope that is necessarily larger than Keck just for the sake of it – in fact, the primary mirror will be larger in diameter by a few centimetres, but the pupil diameter is smaller. Cost effectiveness is a high priority with SALT, whereby a 10m class telescope can be put into operation for about 20% of the cost of a conventional telescope of similar diameter. The trade-off is that 70% of the Southern Hemisphere sky can be accessed with SALT.

“With a useful lifetime of up to 50 years, SALT is an investment for the future. Our geographical location south of the equator and the clear, dark Karoo skies at our Sutherland observatory, where SALT will be constructed, give us a unique, natural advantage in research in astronomy” says Stobie. Essentially the facility will be utilised for a number of existing research projects, including:

- Study of the early Universe
- Quasars and active galactic nuclei
- Galaxy populations
- Planetary searches.

The Royal Observatory was established at the Cape of Good Hope in the 1820's to map the southern skies, especially for maritime navigation. In 1972 a merger of existing observatories established SAAO in SA. Major telescopes were moved to Sutherland where light pollution is at a minimum. Currently SAAO is administered by the Foundation for Research Development that reports to the minister of Arts, Culture Science and Technology.

## **Sidebar: The project team is:**

- Kobus Meiring (Project Manager)
- Leon Nel (Project Manager – Tracker & Optical Payload)
- Mariana de Kok (Project Manager – Facility)
- Clifford Gumede (Control System Specialist)
- Gerhard Swart (System Engineer)
- Mike Lomborg (Business Manager)
- Jian Swiegers (Project Manager – Primary Mirror System)
- Willem Esterhuysen (Project Manager – Telescope structure & dome)

- Nazli Hercules (Administration Assistant)
- David Buckley (Project Scientist).

Although it is a bit early for a full project timeline, one of the team's early tasks is to flesh out the skeleton timeline properly. They are aiming to have a ground-breaking ceremony towards the middle of 2000 and anticipate that SALT will be commissioned by the end of 2004.

The budget for the construction and commissioning of SALT, in March 1999 US Dollars is approximately US\$22,9m. A further US\$5,3m worth of non-cash contributions will be made by the partners. The budget for ten years of operation of SALT following commissioning, again in March 1999 US Dollars is US\$7,08m. Funding is being raised to cover both the construction and 10 years operation of SALT. To date, the following partners have committed funds to SALT:

- The National Research Foundation of South Africa (NRF)
- Nicolaus Copernicus Astronomical Centre of the Polish Academy of Sciences
- Georg-August-Universität Göttingen
- The Hobby-Eberly Telescope Board
- Rutgers, the State University of New Jersey
- The University of Wisconsin.

Negotiations are continuing with other foreign institutions in the USA, UK and New Zealand with regard to additional funding.

SA has a surprisingly large body of engineers, scientists and project managers who have been involved with high technology, multi-disciplinary developments. Many of the sub-systems of SALT are closely related to fields in which SA has significant skills, but inevitably there are also elements for which the technology is only available internationally. An example of this is the manufacture of the 91 mirror elements that will be produced overseas and shipped to SA.

The actual construction of SALT and the installation of systems, will be done by SA as far as possible. International experts might be required from time to time for specific requirements. Fortunately many of the personnel involved in the HET construction are available for the project, and maximum use will be made of this resource, especially during the commissioning of the system.

As part of the contribution of the HET Board to SALT, the HET Board is contributing a significant amount of the time of the personnel of HET and the McDonald Observatory. In return for this contribution, the HET Board will be allocated observing time on SALT. Therefore the costs associated with skills transfer are built into the project cost, and therefore will not involve any cash cost to the project.

The project is still in the detailed planning phase, and while a range of companies have been approached to provide cost estimates, these were used to refine the cost estimate of the project when it was still in its embryonic stage. No tenders have yet been issued to any companies.

**The choice of Sutherland as the site for SALT is motivated by three main factors:**

- One of the prime drivers for the selection of Sutherland as the target site for SALT is that it is a Southern Hemisphere site. The Southern Hemisphere has relatively few telescopes, and the different time zone from Chile means that it will create a situation where there can be 24 hour viewing in the Southern Hemisphere.

- The conditions for observing from this site (quality of “seeing” in astronomical parlance) are extremely good (dark nights, elevation above sea level, atmospheric conditions amongst others). A major survey was conducted in the early 1970’s to optimise the selection of the site for the current SAAO observing site at Sutherland. A study is currently underway to optimise the site selection for SALT within the current SAAO observatory complex at Sutherland.
- Thirdly, siting SALT at the observatory at Sutherland means that it will benefit from the existing infrastructure and that there are already personnel on site who will be able to maintain the telescope and its related systems. The cost of building what would essentially be a complete new observatory should it not be co-located with the current telescopes at Sutherland would be completely prohibitive.

SALT is a multi-national project, and the allocation of observing time will be related to the distribution of funding provided by the various partners. As South Africa’s share of the funding is below 50%, more than 50% of SALT’s utilisation will be by international institutions and scientists.



**Caption – Digital image of the proposed 10-m class Southern African Large Telescope (SALT) superimposed on a photograph of some of the existing telescopes at the South African Astronomical Observatory site near Sutherland, Northern Cape.**

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