

ASSA (Historical Section)

African Astronomical History Symposium

2005 November 8 & 9
Cape Town



<http://www.sao.ac.za/assa/aahs>

Freestanding megalith at
Nabta Playa (Egypt), courtesy
Combined Prehistoric Expedition

■ monday, october 7

- 18:00 – 20:00 Registration & wine and cheese reception
McClellan lab and dome, SAAO, Cape Town

■ tuesday, october 8

Indigenous African Astronomy Ideas & Beliefs

- 08:30 Registration
SAAO Auditorium, SAAO, Cape Town
- 09:00–09:10 Welcomes, etc.
- 09:10–10:00 Astronomy and Stelae at Nabta Playa
Prof John McKim Malville
Dept Astrophysical & Planetary Science, University of Colorado
Lying about 100 km west of Abu Simbel in southern Egypt, Nabta Playa is an internally drained basin, which was occupied by pastoralists in the period of 11 000 – 5 000 years ago. During that time, the hyper-aridity of the Western Desert was interrupted by the northward movement of the summer rains of tropical Africa. Beginning about 7 500 years ago a regional ceremonial center was established containing cattle burials, complex stone structures, a calendar circle, and sandstone stelae. The presence of these massive stelae suggests a long-lived political authority and a ceremonialism involving both the sun and stars. Like Stonehenge, the stelae of Nabta Playa have generated both science and controversy.
- 10:00–10:30 The Sky's things: /Xam Bushman cosmology
Jeremy C. Hollmann
Dept of Archaeology and Anthropology, Natal Museum, Pietermaritzburg
According to the /Xam, or Colonial Bushmen, who lived in what is now South Africa's Northern Cape Province, the celestial bodies and their present composition, position and 'behaviour' originate in events that took place in a mythological time in which all living organisms and natural phenomena possessed, simultaneously, human characteristics as well as those nascent properties which would later come to define them as the entities we know today. This presentation chronicles various /Xam narratives in which the nature and origins of 'the sky's things' are explained.
- 10:30 – 10:40 tea / coffee

- 10:45 – 11:00 /Xam astronomical references in G R von Wielligh's *Boesman-Stories*
W P Koorts & A Slotegraaf
South Africa Astronomical Observatory; Astronomical Society of Southern Africa
The primary source of /Xam sidereal narratives are the well-known works by Bleek and Lloyd. We present two new /Xam accounts, explaining the origin of the Sun and the origin of the Evening Star, as collected and retold in Afrikaans by G R von Wielligh in *Boesman-Stories*, Part 1. We also present an English translation of those parts of the book which contain astronomical references.
- 11:00–11:10 Comets in bushman paintings
Brian Fraser
ASSA Johannesburg Centre
One of South Africa's experts on Bushman painting, Bert Woodhouse, has a section in his collection of thousands of slides of paintings, of what he calls "comets". We will have a look at some of these and discuss his identification of the "comets"
- 11:10 – 11:35 The Indigenous Astronomical Knowledge of the Xhosa
Temba Matomela
Iziko Planetarium (Cape Town)
Xhosa people named many stars and star patterns in the night sky, and derived their calendar from heliacal risings and the cycle of the Moon. In particular, the reappearance of Isilimela (Pleiades) was used to set the date of initiation ceremonies. Planets were also observed. Much knowledge has already been lost but the author has attempted to recover as much as possible through field trips and radio broadcasts.
- 11:35–11:50 Setswana astronomical nomenclature
Lerothodi Leeuw
University of Chicago
Africans across generations, like many people across the globe who can see, have been awed by the night-sky that is visible to the human eye, i.e. their natural astronomical instrument. To varying degrees, they have studied, commented on, and devised language for, often very specific and instructive, astronomical objects of their interest. As we await full scientific operations of the Southern African Large Telescope (SALT) and its studies of some of the optically faintest objects in the sky, we examine (or re-examine) selected names and understanding of astronomical objects in the Setswana language of South Africa and Botswana. We focus on their educational, scientific and cultural relevance today and in the past, giving special mention to the Moon and Venus, the optically brightest objects in the sky after the Sun.

● 11:50–12:05 The Timbuktu Science Project

Thebe Medupe, Brian Warner, Shamil Jeppie & Sharron Hawkes

SAAO, UCT

Over six hundred years ago, Timbuktu was a major commercial centre in West Africa. Because of its prosperity, the city attracted Islamic scholars from the Islamic world, creating large learning centres. Books were traded, and local scholars wrote substantial original works as well. The subject covered in these centres included astronomy, mathematics, optics, literature, law and religion. We have started a project to search for the astronomy, mathematics and optics in these manuscripts. This is an introduction of what the project is all about, and the feasibility studies of the project.

● 12:05–12:35 Astronomy and Culture in Nigeria

Dr J.O. Urama

Dept. of Physics & Astronomy, University of Nigeria, Nsukka

Astronomy cannot be said to be entirely new in Nigeria. Most of the ethno-astronomical views are revealed in the folklore, ancient architecture, religious practices, traditional poetry and art works of the different ethnic groups. In Nigeria, there are hundreds of cosmogony and ancient astronomical practices that need to be studied systematically. This paper discusses the need to bridge the gap between ethno-astronomy in Nigeria and modern astronomy by providing scientific interpretation to such cosmogonies and ancient astronomical practices.

● 12:35–12:55 The Making of *Cosmic Africa* – Research behind the film

Anne Rogers

Film maker, Cape Town

The African continent, with its great variety of cultures and ancient skylore, provides an ideal backdrop to examine and unearth indigenous astronomical knowledge that, for the most part, has largely remained undocumented. Several years ago a small group of filmmakers set off to document some of this knowledge which culminated in the documentary film, *Cosmic Africa*. The film was based on extensive field research which drew on the expertise of village elders, sky experts, shamans, historians, archaeologists, linguists, astronomers and anthropologists from seven countries. The vast and complex subject matter was eventually narrowed down to focus on archaeological evidence and the traditional knowledge of three different societies: the mysterious prehistoric cattle herders of the Egyptian Sahara (Nabta Playa), the Dogon of Mali (settled farmers) and the hunter-gathering lifestyle of the Ju/'hoan culture of north-eastern Namibia. This paper will address the various research methods used in the making of *Cosmic Africa* and also outline some of the rich and fascinating subject material – from countries such as Ghana, Swaziland and Kenya – which was omitted from the film.

● 13:00–14:00 lunch

● 14:00–14:45 The Cultural Astronomy of Africa - Recent Activities

Dr Jarita C. Holbrook

Bureau of Applied Research in Anthropology, University of Arizona, Tucson

We have reached a pivotal time in the study of the cultural astronomy of Africa. The last ten years has seen African scholars initiating projects, an increase in articles focused on African astronomy, the recognition of research in African astronomy at international meetings, and the building of a network of scholars and students. Together, let's look at what has been accomplished in African cultural astronomy and what remains to be done.

● 14:45–15:30 Problems and Prospects in the Cultural History of South African Astronomy

Prof Keith Snedegar

Dept of History and Political Science, Utah Valley State College, USA

The inauguration of SALT is an auspicious moment to reflect on the history of South African astronomy, the manner in which it has been represented in the past, and how it might best be represented in the future. To begin, I will suggest that there is much to be learned about indigenous African astronomical practices, and the study of regional ethno-astronomies has value in advancing culturally relevant basic science education. I will also propose a mature historiography that embraces rather than avoids the issues of identity, politics, and racism in the modern South African astronomical community. The character of national institutions such as the Union/Republic Observatory and the SAAO, popular attitudes (black, white, and coloured) toward astronomy, the political dynamics of international collaboration, and the gradual transition from fundamental astronomy to astrophysics – all offer illuminating case studies of how the science was practiced and perceived. In other words, historians have plenty of opportunity to explore the manifold construction of human meaning in South African astronomy, and should not content themselves with the representation this rich scientific enterprise as personal anecdotes of data collection.

● 15:30 – 15:45 tea / coffee

● 15:45 – 17:45 *Workshop* – Social and Historical Aspects of the proposed NRF Astronomy Frontiers programme

Facilitator: **Ms Candice Levieux** (*National Research Foundation*)

In developing the Astronomy Frontiers Programme there is a shared and agreed vision that the social sciences and humanities research can actively make a contribution to the initiative by developing an understanding of the place and meaning of the night sky in African societies – past and present. To this end, the workshop aims to begin a discussion about possible directions of enquiry within this theme and to map a process for its further development. The workshop is open to all conference attendees.

Talks during the workshop will be given by Keith Gottschalk, Dr Otsile Ntsoane, Dr KJ de Beer & Dr M J Hoffman, as follows (*overleaf*):

● The Political Uses of Astronomy and Astronautics in South Africa

Keith Gottschalk

Political Studies Department, University of the Western Cape

Astronomy and Astronautics lobby their cause in Western and developing countries alike as the gateway to attract young minds into careers in science, maths, engineering, and technology. The first democratic Government in South Africa, in its first decade, has surprised its friends and critics alike by committing more budget to Astronomy than all previous governments since 1910. The Minister of Science and Technology has announced that the young democracy will establish a national space agency. No leader of the Government or ruling party is known to have astronomy as his or her personal hobby. What caused these unexpected developments? How may astronomy maximize this political trend? What are the optimal strategies to sustain this state commitment? What would Government be receptive to in exchange?

● Scientification of Africa's Intellectual Heritage: What They Did Not Tell Us About The Sky People and Mystery

Dr Otsile Ntsoane

Indigenous Knowledge Systems Unit, Dept of Science & Technology, SA

The dawn of the new millenium and the branding of this epoch to be the African century revealed esoteric and wisdom based knowledge systems which were kept secret and sacred for many centuries before. The history of heavenly bodies and the interpretations of the galaxies should not be a monopoly of western science and its technology but a shared wisdom combining human intellectual evolution and human settlement based on cosmology. This paper will look at selected texts about the Afrocentric cosmology and how it is linked to the human development and social cohesion and philosophy among BaSotho/BaTswana as case studies of Southern Africa and Dogons of Mali representing North-Western Africa. A conclusion is drawn by demonstrating that philosophy and cosmology are the basis for defining a cosmogony among African communities. What is of essence in this African century is to open the window for multiple interpretations of the universe. This includes utilizing African Indigenous Knowledge Systems and orality in knowledge production and research.

● An Africanized study of astronomical history in the Northern Cape (South Africa) for purposes of secondary and higher education programmes in tourism management

Dr KJ deBeer & Dr MJ Hoffman

Central University of Technology, Free State; University of the Free State

Dr MJ Hoffman, Head of the Department Physics, UFS, presented an address at the Duineveld Secondary School in Upington to enhance courses in Tourism Management. He referred to the prominent role of astronomy as well. Very aptly, the National Institute for Higher Education (Northern Cape) also invited an astronomer, Dr T Medupe, to address

their graduation ceremony in 2005. However, Dr Albert Strydom, Programme Head of Tourism Management at the CUT, is much aware of the delicate nature of this type of high scientific profile in Tourism Management. It is foreseen by Dr KJ De Beer, Director: Distance Education, that Teaching and Learning in this field will be predominantly conducted via Open Learning and Distance e-Learning methodology (ODEL). Subsequently, it is also important to understand the philosophy of ODEL within global and Africanized perspectives. Astronomy in this case offers excellent examples of Africanized science in practice to add scientific value to tourist packages in the Northern Cape.

● 19:30 Conference dinner

Wild Fig Restaurant, Courtyard Hotel.

Situated up the road opposite the entrance of the SAAO. Secure parking available.

■ wednesday, october 8 Contributions to Modern Astronomy

- 09:00–09:45 The Origin and Development of the Royal Observatory, Cape of Good Hope

Prof Brian Warner

Department of Astronomy, University of Cape Town

This Symposium is taking place at the site of the old Royal Observatory, Cape of Good Hope. There are many buildings and remains of the long history of astronomy that was carried out there. The talk will give an overview of the beginnings of the observatory, and of its work, which will help to inform the visitors of the nature of the extant buildings and instruments.

- 09:45–10:30 The Southern African Large Telescope

Kobus Meiring

SALT Project Manager

The Southern African Large Telescope (SALT) is a 10-m class telescope for optical/infrared astronomy based on the tilted Arecibo design first adopted by the Hobby Eberly Telescope. SALT has been constructed by a South African project team commissioned by a consortium consisting of 11 partners from six countries. SALT will enable a quantum leap in astronomical research capability in the African continent, where up to now the largest telescope was a modest 1.9-m, dating to the 1940s. The SALT Project was approved in November 1999, groundbreaking followed in September 2000, and “First Light” was announced on 1 September 2005, exactly five years after groundbreaking. SALT has subsequently started scientific observation, while instrument commissioning is on-going. The major technical obstacles in SALT were the alignment of the 91 identical spherical mirror segments, the position feedback of the prime focus tracker, and the dome seeing associated with large enclosures at a sight with large daily thermal cycles. All of these issues were addressed thoroughly during the design phase, and observations are showing very positive results in all these areas. This talk will summarize the international partnership in SALT and the management and organisation of the project and then address the basic design, with emphasis on the technical challenges and the specified performance of SALT, and then summarise the construction process.

- 10:30–10:45 tea / coffee

- 10:45–11:00 Discovery of the nearest star

Dr I.S. Glass

South African Astronomical Observatory

Proxima Centauri, the nearest star other than the Sun, is part of a triple system, its other members being the two components of the bright double star Alpha Centauri. In the nineteenth century, Alpha Cen was the nearest star known, thanks to data obtained at the Royal

Observatory, Cape of Good Hope. Proxima, the present nearest known star, was discovered to be such in 1917 at the Union (later Republic) Observatory in Johannesburg.

- 11:00–11:30 Some glimpses into the past at the Johannesburg Observatory

D J Vermeulen, presented by A W Herder

ASSA Johannesburg Centre

This presentation is illustrated with some of the many pictures appearing in the author’s book ‘Living amongst the stars’ which it is hoped will be published in the near future. It starts with the work done by David Gill at the Cape Royal Observatory on astrophotography leading to J C Kapteyn’s contribution to the Cape Photographic Durchmusterung and the subsequent friendly relationships with observatories in the Netherlands. The opening of the Transvaal Meteorological Department in 1905 is illustrated leading to the first astronomical ventures. By 1910 the observatory was committed to southern sky mapping and continued along this path until 1938. The successive telescopes are illustrated. The presentation continues with sketches of the Union and Republic Observatory directors and shows some of their contributions to astronomy and timekeeping. Co-operation with Leiden Observatory is shown at the Broederstroom annexe.

- 11:30–11:45 Introduction to the ASSA Historical website

Chris de Coning

ASSA Cape Town Centre

I wish to give a presentation on the Historical website which forms part of the ASSA website, hosted by SAAO. The purpose is to introduce it to the wider community interested in the history of astronomy. The presentation will include: how the website came about, its goals and aims, its layout / structure, the work that has been done and the advantages of a website as a medium for storing, presenting and making available the information.

- 11:45–12:05 The Large American Refractors in South Africa

Dr Patrick Seitzer

University of Michigan

In the first third of the 20th century South Africa became the center for universities from the USA pursuing astronomy in the Southern Hemisphere. Harvard had its station at the Boyden Observatory near Bloemfontein, while two other universities built and installed large refractors for specific observational programs. The first refractor was the 66-cm of Yale University located in Johannesburg, and used for the photographic determination of stellar distances. The second was the 68-cm visual refractor of the University of Michigan located at the Lamont-Hussey Observatory on Naval Hill in Bloemfontein, and dedicated to visual observations of double stars. These telescopes became the first southern hemisphere stations for both universities. While both were used extensively for many years, sadly neither telescope remains in existence today. The Yale refractor was moved to Mt Stromlo in Australia in 1952, where it was destroyed in the fire of 2003.

Observations with the Lamont refractor continued until 1971, and shortly thereafter the lens was returned to Michigan and the telescope parts removed from the dome (now used as a theatre).

- 12:05–12:30 Contributions from the First Half-Century of African American Astronomers with a Focus on Solar Physics.

Dr Hakeem M. Oluseyi

University of Alabama, Huntsville

It has been exactly half a century since the first African American received a Ph.D. degree and successfully entered into a career in astronomical research. Since that time, a total of twelve scientists have followed in the wake of this trailblazer. Exactly half of these chose to spend a major portion of their career in the field of solar physics. The contributions of these six individuals have had a profound impact on our understanding of the sun, stars, and their immediate environments. In this talk I will review the scientific contributions of these scientists and develop the historical & social context their work.

- 12:30–13:00 Tour of the Royal Observatory

- 13:00–14:00 lunch

- 14:00–14:45 Amateurs in the Antipodes: The Common Denominators of South African, Australian and New Zealand Astronomy during the Nineteenth and Early Twentieth Centuries

Dr Wayne Orchiston

James Cook University, and Anglo-Australian Observatory

During the second half of the nineteenth century amateur astronomy flourished in Australia. Like their professional counterparts, Australia's leading amateurs carried out wide-ranging astronomical observations. Comets, planets, minor planets, lunar occupations, Jovian satellites, transits of Mercury and Venus, solar and lunar eclipses, double stars and variable stars all belonged in their portfolios, and they published in international journals and relentlessly popularized astronomy. Local societies were founded, and amateur telescope-making came of age. However, a major change took place during the first two decades of the new century as Australian amateurs turned increasingly to comets and variable stars and abandoned other celestial targets. South Africa and New Zealand had much smaller nineteenth century amateur astronomical populations, and the few international-level amateurs tended to focus: with South Africa's AW Roberts it was variable stars while for New Zealand's John Grigg it was comets. These two fields then increasingly captivated the growing bands of observationally-oriented amateurs in both nations between 1910 and 1930 – just as in Australia. In this paper we will embark on a 'Cook's tour' of South African, Australian and New Zealand amateur astronomy of the period 1850-1930. We will explore some of the key personalities, visit their obser-

vatories and instruments, review their observations and discuss their involvement in the earliest astronomical groups and societies. Along the way we will compare and contrast the patterns in these three countries, identify 'common denominators' and major differences, and seek explanations for these.

- 14:45–15:05 Some forgotten instruments and oddities concerning this Observatory

Rupert Hurly

ASSA Cape Town Centre

Since 1957 things that have been here but have been removed or are no longer used include: the large searchlight, the kine-theodolite, three sets of Moonwatch telescopes, the 6-inch used twice daily for sunspot photographs, the hydrogen-alpha filter sun camera, the 40-inch now in Sutherland, the Danjon Astrolabe and the Transit instrument.

- 15:05–15:25 Transit of Venus Observations and Relics in South Africa
W. P. Koorts

South African Astronomical Observatory

Apart from local observations, two international expeditions observed the 1882 Transit of Venus from South Africa. The British/South African efforts observed from four stations, using a total of 11 telescopes while the Americans employed four instruments, including the telescope of the ladies seminary where they stayed. Very few relics survived to this day. Most well known are the two concrete piers in Touws River. A Dallmeyer equatorial mount was recently discovered at a school in Somerset West which may have originated at the Touws River site.

At SAAO Cape Town, a typical "transit of Venus" 6-inch Grubb equatorial, used by Sir David Gill, is still in working condition. The wooden tube 7-inch Merz refractor, used by George Maclear (son of Sir Thomas), today serves as a finder telescope and its original "cannon ball bearing" dome and equatorial mount can be seen, right next to the venue for the AAHS.

The site at Aberdeen Road in the Eastern Cape was recently located using a GPS fix and the area examined for possible relics. Unfortunately none were found but the position of the site with respect to Aberdeen Road raises some questions.

The position of the site of the American expedition to Wellington could since be located within metres after obtaining Simon Newcomb's report, showing that my previously assumed position was wrong. His report further revealed some interesting details not known before.

- 15:25–15:45 tea / coffee

● 15:45–16:00 Astronomy at Unisa

Prof Derck Smits

UNISA

In 1916 the University of the Cape of Good Hope, an examining body with the power to grant degrees, was transformed into a new federal university. The name of the institution was changed to the University of South Africa (Unisa) and its headquarters were moved to Pretoria. Astronomy has been offered at Unisa since 1923, the same year in which the Astronomical Society of Southern Africa was formed. In response to pressure from unattached students from all races to obtain qualifications without attendance at a university or college, in 1946 Unisa started teaching some subjects internally. With about 200,000 students, Unisa is one of the largest distance education institutes in the world. In 1960 Mr J. Wolterbeek was appointed as the first full time lecturer in Astronomy, and in 1972 the 9-inch Reunert Telescope, donated to Unisa by the Republic Observatory, was installed in a roof-top observatory on the new Theo van Wyk building on Muckleneuk Ridge. Unisa currently offers a BSc major in Astronomy and post-graduate tuition up to the PhD level.

● 16:00–16:30 Forty years of radio astronomy at Hartebeesthoek

Michael Gaylard & George Nicolson

Hartebeesthoek Radio Astronomy Observatory

In 1961 an 85-foot (26-metre) diameter radio antenna was erected at Hartebeesthoek near Johannesburg, as NASA's Deep Space Instrumentation Facility 51. A young South African engineer employed there soon initiated a radio astronomy research programme to use free time between tracking spacecraft. On the closure of the facility by NASA in 1974, it was re-constituted as a radio astronomy observatory operated by the CSIR. In this presentation we highlight various strands of the forty year history of radio astronomy at Hartebeesthoek. We also cover some of the perhaps surprising spinoffs that it has generated, both scientifically and practically. Some of these spinoffs hark back to measurements taken by de la Caille at the Cape in the 1750's, and to the reasons for establishing a Royal Observatory there in the 1820's.

● 16:30 Discussion, comments & concluding remarks

■ poster papers

Royal Observatory, Cape of Good Hope: The Vanished Past

Dr I S Glass (SAAO)

The Royal Observatory site is an architectural palimpsest: while some of the early buildings remain, others have disappeared and their sites have been built over. This poster shows an index map of the campus with pictures from the archive of vanished buildings such as the Wind Tower (site of the first photographic sky survey, the Cape Photographic Durchmusterung), the magnetic observatory of the 1840s, the remains of the Franklin-Adams observatory etc. Some of the photographs (taken by C.P. Smyth) date from ca 1843 and are the oldest in existence of any observatory as well as being the earliest made in South Africa.

San Scientific astronomy

Graham Rodgers (ASSA Cape Town)

The San (Bushmen) people devised an astronomical instrument, a modified form of bored-stone and digging stick, to site and orientate observing shrines, some of which are extant, 60 km south of the SALT telescope. The presentation will consist of illustrations to explain the interpretation of the hyperbola pattern obtained from the stele. The pattern indicates the equinoxes with a straight line along the congruent axis of the hyperbola, on the equinox dates. Practical Demonstration: A practical demonstration will be set up in sunlight to be viewed during the tea/coffee or lunch breaks, and explanations given of San beliefs and lore, to account for the building of the shrines.

The nature of the Dawn's Heart Star

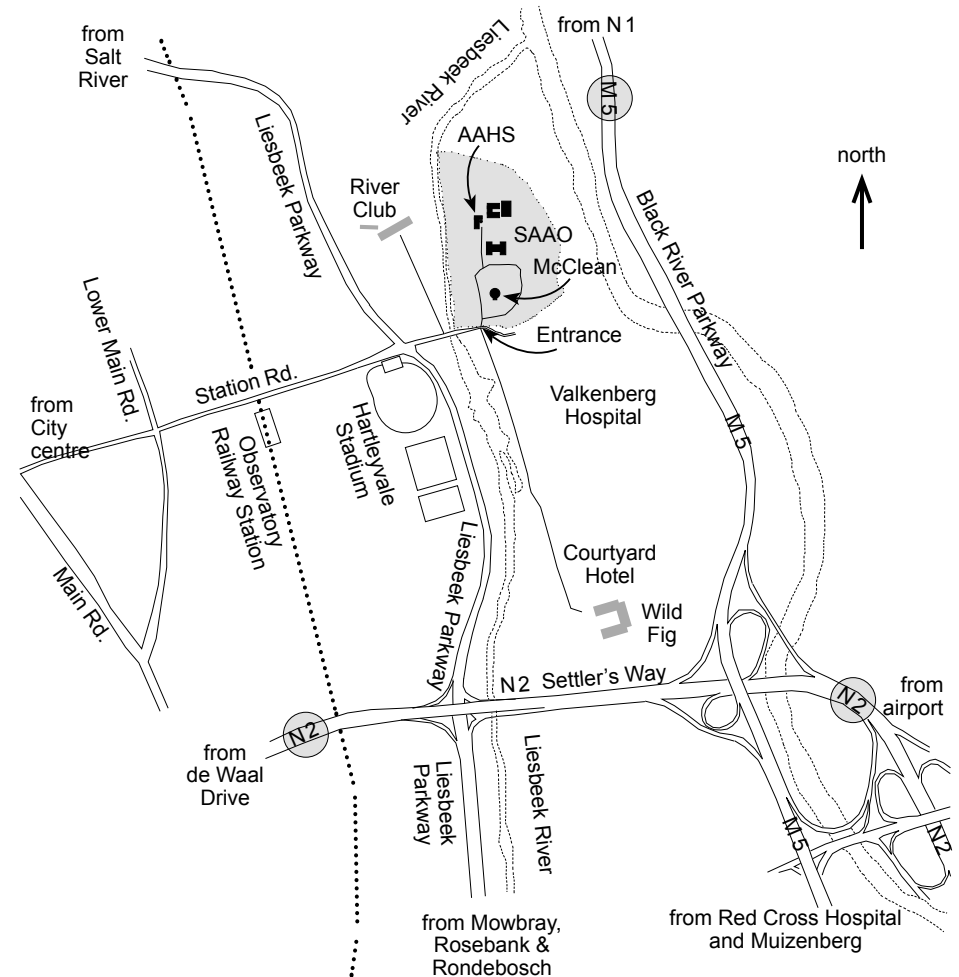
W. P. Koorts (SAAO)

One of the most developed San narratives is the story of the Dawn's Heart. Not only does it link Earth/Sky, Day/Night and Culture/Nature but continues to present the Dawn's Heart Star with an accompanying legend, telling about a very close relation between father and child. In contrast to Venus outshining Jupiter by far, the /Xam saw Jupiter as the Dawn's Heart Star. Bleek recorded that this southern dialect had related but two separate words for Jupiter and Venus, suggesting that they did not mix them up. Westerners had often been astounded by some of the abilities attributed to the San, amongst which was extraordinary eyesight. The possibility for them to be able to see some of Jupiter's moons is a present-day legend. Two primary sources claim that the movements of Jupiter's Galilean moons exactly fits this legendary story of a child being swallowed, being spat out, always following her parents closely. Over the years a number of accounts of people spotting Jovian satellites were recorded. Schaefer (1991) developed a model showing that above-normal eyesight is indeed required, but that it is quite possible. This explanation is offered to why Bleek (1875) mistook it for a nearby background star (Regulus) when his /Xam informant tried pointing out the significance of the Dawn's Heart Star to him. It is suggested that it was impossible for Bleek to see what was so clear to his keen-eyed informant.

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■ map of SAAO and surroundings



■ proceedings

The proceedings will be published in *African Skies/Cieux Africains*. Talks of around 3/4 hour may have up to 7 pages, the half-hour talks up to 4 pages and the others (including posters) up to 2 pages. The journal takes about 900 words per page. At 10pt, single-spaced A4 is about right. Pictures should be submitted with high resolution in jpg or other formats. Pay particular attention to the resolution of line drawings. Articles should be submitted before the end of 2005 to di@saa.ac.za, mentioning AAHS. Articles will be subject to editorial review.

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