The PRETORIA CENTRE
of the
Astronomical Society of Southern Africa
www.pretoria-astronomy.co.za

NEWSLETTER, SEPTEMBER 2004

The next meeting of the Pretoria Centre will take place at Christian Brothers College, Pretoria Road, Silverton, Pretoria

Date and time	Wednesday 22 September at 19h15
Chairperson	Johann Swanepoel
Beginner's Corner	"Understanding coordinate systems" by Johan Smit
What's Up	by Wayne Mitchell

++++++++++ LEG BREAK - Library open ++++++++++++

Main Topic "Manual Astronomy" by Manuel Baeza

The meeting will be followed by tea/coffee and biscuits as usual.

The next social/practical evening will be held on Friday 17 September at the Pretoria Centre Observatory, which is also situated at CBC.

INSIDE THIS NEWSLETTER

LAST MONTH'S MEETING - by Neville Young

Mike Haslam took over the chairmanship from Wayne so that he could have the pleasure of introducing his friend Richard Wade as the guest and main speaker for the evening. Richard is in fact a member of the Pretoria Centre, but due to his own active archeo-astronomical life, is not able to regularly attend our monthly meetings.
Richard entertained in his own unique way - intriguing suggestion mixed with subtle humour, keeping the audience hanging on every next word. Was there an astronomical significance in the Zimbabwe ruins? Does the alignment of building point to a southern hemisphere supernova not recorded in western history? Who were the builders? Where did they come from? Richard's lifetime of research left us with tantalising possible answers to these questions and we will be watching with aniticipation as Richard's hypotheses begin to draw interest from the worldwide media. Thank you Richard.
Beginner's Corner was used by Tim Cooper to introduce us to the ever growing deterioration of our dark skies. We and our descendants run the risk of losing this window onto the universe. Neanderthal man would no doubt say that we have lost it already. Tim provided a means for us map the quality of the Gauteng night skies using a series of charts and submitting results to him on a report sheet. Tim's power point presentation as well as the charts and report are on our centre website. See the Light Pollution link on the home page. Your report from wherever you live - inner city or out-of-town plot - will help Tim compile this sky glow map.
Koos van Zyl used his Sky Guide computer program to clearly illustrate how to see the close grouping of the Moon, Saturn, Venus and Mercury on the morning of 9th and 10th September. He also explained how he navigates his way around the sky using standard constellations and other asterisms. Recognizing star patterns and finding one's way around the sky is the first step to maximising the pleasure in our hobby.

VERLEDE MAAND SE WAARNEMINGSAAND deur Johan Smit

Daar was maar 10 mense. Die meeste ander wat gewoonlik daar is, was besig by die Kollonade. Eerstens was die krag af, en na 'n gesoek het ons uiteindelik die hoofskakelaar gevind wat uitgeklink het.

Die lug was 'n bietjie helder, maar soos die maan gesak het, het dit verbeter. Ons het na die maan, Omega Centauri en die Juweelkissie gekyk met die 12". Peet van der Walt het sy 8" Dobsonian ook daar gehad en ons het meestal met sy teleskoop gespeel. Ons het op die area tussen die skerpioen and die boogskutter gekonsentreer en baie van die M-voorwerpe gesien.

Ander voorwerpe was Albireo en ons het die dubbel-dubbel in Lyra probeer opbreek. Dit was minder suksesvol. Ek het al die mense daar gewys waar om die "coathanger" te kry, met 'n verkyker. Almal was baie bly en vasbeslote om hul nuwe kennis en vermoens te gaan toepas.

Ek en Peet het heel laaste geloop en die hoogtepunt was toe ons vir 47 Tucanae gevind het - na 'n lang gesoek in die helder lug - redelik laag op die horison.

The Obliquity of the Earth's Axis - by Michael Poll

If the Earth's axis were upright, the sun would always be overhead at the equator, and there would be no seasons, no tropic lines, and no Arctic and Antarctic circles.

However the Earth does not go around the sun in the upright position. Its axis is currently tilted at an angle of 23.43°. The slope of the axis is called the obliquity of the Earth, and the angle is the angle between plane of the Earth's orbit around the Sun and the plane of the equator. The value is currently decreasing by 47.5 seconds of arc (0.013°) per century, which means that the Earth is becoming more "upright".

The changes in obliquity are principally a consequence of precession of the Earth's axis, which is caused by the gravitational effect of the Sun and moon on the Earth's equatorial bulge, and the precession of the Earth's orbit, which is caused by gravitational attraction of the other planets.

The obliquity oscillates with a period of 41 000 years, so a half cycle from maximum to minimum is approximately 20 500 years. The total angle of oscillation is about 1.3° either side of the average value of 23.3°, giving a maximum of 24.6° and a minimum of 22.0°, but the range of oscillation varies from cycle to cycle. In the current cycle the maximum angle of 24.2° occurred 9500 years ago, the next minimum of 22.6° will occur in 10 200 years from now. At present the Earth is about half way between maximum and minimum, and the rate of change is at its greatest. The rate of change varies during the cycle.

Because the Earth is becoming more upright, the Tropic of Cancer and the Tropic of Capricorn are both moving towards the Equator; the Arctic Circle is moving north and the Antarctic Circle is moving south.

The tropics are moving towards the equator at rate of 4 centimetres per day, 14.7 metres per year, which equates to about 1 km in 68 years The area of the Earth's surface that lies between the tropics decreases by 1080 square kilometres per year. Of this area only 330 square km is dry land. Of the 330 sq km, 110 sq km is in Africa, which is the only continent that both tropics pass through. In the case of the polar regions, the area inside the Arctic and Antarctic circles decreases by a total of 470 sq km per year.

At the rate the tropics are moving, monuments marking their position become quickly displaced. In Taiwan a monument erected in 1908 had a park created around it, but the tropic has now moved out of the park, and the land where it is now situated is not available.

In South Africa the Tropic of Capricorn crosses five major roads: (a) R517 north of Lephalale (Ellisras); (b) R35 from Potgietersrus to Groblers Bridge; (c) R521 from Polokwane to Alldays; (d) N1 between Polokwane and Louis Trichardt; and (e) R36 from

The Obliquity of the Earth's Axis continued

Bandelierkop to Soekmekaar. The tropic is signed on (a) (c) and (d) but not on (e), and it is also signed on a minor road from Marken to Baltimore (east of Lephalale) (personal observations). It is not known to this writer if there is a sign on the R35. With reference to (e), the 1976 edition of the 1:500,000 Pietersburg map indicates that, next to the tropic, a place called Middagson lies 3 km off the edge of the map. However this place is not marked on the adjoining map (1:500,000 Phalaborwa, 1980 edition)

There is a monument on the N1 that acknowledges the northward movement of the tropic. The site was moved northwards about a kilometre or so in 1986, and a monument erected. The plaque on the monument reads as follows:

TROPIC OF CAPRICORN POINTER NEEDLE

The Tropic of Capricorn is a line of latitude, at present approximately 23.5 deg south of the Equator. It indicates the most Southern Declination of the Sun, in other words, the position where the Sun is perpendicularly above the Earth at noon. This takes place on or about 22 December, and is known as the Summer Solstice in the Southern Hemisphere.

The name "Tropic of Capricorn" (just as "Tropic of Cancer" in the Northern Hemisphere) was chosen by astronomers when they noticed that the Sun, at its most southerly point would appear to be in the Constellation of Capricorn. Today the Sun no longer occupies this constellation at the Summer Solstice, but the name remains.

The Earth not only rotates on its own axis, but the axis describes a conical tilting movement known as the Precession of the Equinoxes. This causes the declination of the Sun, and thus also the Tropic position to change. This cone is completed in 25,800 years. The Tropic thus drifts 14.5 m per year northwards, for 12,900 years, then southwards again for 12,900 years. Theoretically this represents a drifting of 186 km in each direction. It can however be influenced by a number of factors, namely the turning movement of the liquid core of the Earth, or the tidal action between the Moon, Sun and the Earth, the ambient wind directions or even severe Earthquakes.

The Tropic of Capricorn will drift past the pointer needle at the beginning of the 22nd Century.

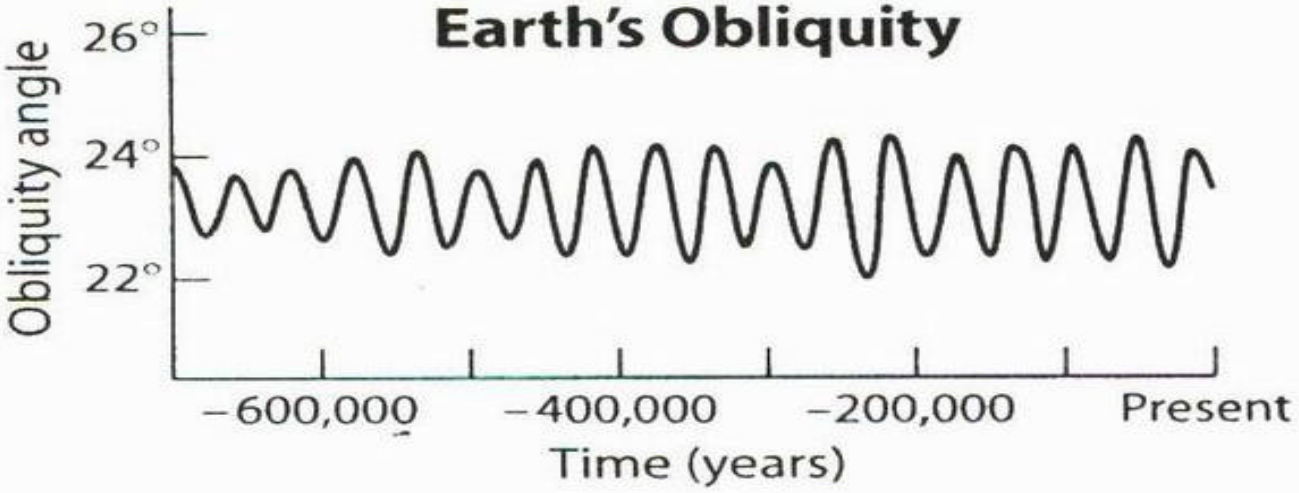
This pointer needle was erected by the Transvaal Provincial Administration and unveiled on 8 February 1986 by W A Cruywagen, Administrator of the Transvaal, during the Centenary of Pietersburg.

References:

The Incredible Shrinking Tropics
David P Rubincam, B Fong Chao, Bruce G Bills

Sky & Telescope June 1998 p36

1:500,000 maps published by the Government Printer, Pretoria



The Earth's obliquity — the angle between the planes of its equator and orbit around the Sun — oscillates with a period of 41,000 years. Currently the obliquity is near its average value of 23.3°.

SPELLING PROBLEM ON THE R521

SEDNA

The mystery surrounding Sedna - the most distant object ever seen in the Solar System - deepened as astronomers calculated that the planetoid's "missing" moon must belong to an entirely new class of celestial object, and is possibly the darkest body in the Solar System.
For more information, go to the website with address
http://www.newscientist.com/news/news.jsp?id=ns99996295

FUTURE TALKS

27 October :
How to make a model of a comet
by Koos van Zyl

Interplanetary transfers
by Michael Poll

24 November :
The Cassini / Huygens mission to Saturn
by Neville Young and Mike Haslam

26 January :
The closest stars
by Lorna Higgs (tentative)

A WEBSITE FOR SCI-FI ENTHUSIASTS

www.scifi.com

THE SUN, OUR STAR

National Geographic magazine for July 2004 contains a good popular article that gives a summary of the present state of knowledge in the specialized field of Solar Astronomy.

HOW DID THEY DO IT ?

During the recent transit of Venus, did you wonder exactly how the astronomers of the 1700's used observations of such a transit to determine the distance of the earth from the sun ? I think I have figured it out. It entails some mathematics (fairly elementary, though). If you are interested, send me an email message. I will then send you a copy of my notes and of a relevant article from Sky & Telescope.

EDITOR

ASTRONOMICAL WEBSITE ADDRESSES

2MASS**:** www.ipac.caltech.edu/2mass/

Life on Mars: http://redplanetlife.com
http://www.cydoniacontroversy.com

Martian “fossils”: http://csmonitor.com/2002/0412/p25s02-stss.html
Life on Mars and Jupiter’s moons:
http://www.dummysoftware.com/mars/index.html

ASTRONOMY EXHIBITION AT THE KOLONNADE
by Neville Young

Thanks to the organisation of Rynhardt van Rooyen and Wayne Mitchell, we had a busy and successful exhibition at the Kolonnade from 9am to 9pm on Saturday 21 August. Working with them in relays were Mauritz Geyser, Carel Boshoff, Dewald van Rooyen, Tim Cooper, Neville Young, Peet van der Walt, Johan Smit and Andrie and Casper van der Linde.

Crowds streamed through our exhibition all day, looking at a freckled sun and then later at the Moon and Alpha Centauri. The surprise and wonder on the faces of parents and children and even "cool" teenagers remains an inspiration to continue expanding minds. We will surely see a number of new faces at the next meetings.

A special moment was seeing a mother guiding her blind daughter's hands over the solar system model.

The attached pictures give an idea of the exhibition.

Astrophotography

Object:
Omega Centauri
Camera:
Canon Digital Rebel
Telescope:
Orion Skyview Pro 8
Method:
Prime Focus
ISO setting:
400
F-stop:
4.9
Exposure:
Composite of 30s and 60s exposures.
Date:
9 June 2004
Photographer:
Koos van Zyl, a member of our Centre

PRETORIA CENTRE COMMITTEE

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