WAS NEWS

Monthly Newsletter of the **W**orthing **A**stronomical **S**ociety

Official website: www.was.org.uk
Affiliated websites: www.observatory99.freeserve.co.uk

Number 143 **June 2001**

ALMANAC

All times U.T. for B.S.T. add one hour

June./ July.

LUNAR

June	Date	Time	rise	set
Full Moon	6th	01.39	20.47	04.06
Last Quarter	14th	03.28	00.50	11.57
New moon	21st	11.58	03.36	20.35
First Quarter	28th	03.19	12.25	00.15
July				
Full Moon	5th	15.04	20.31	03.26
Last Quarter	13th	18.45	23.45	11.59
New moon	20th	19.44	03.14	20.15

EARTH

June	Sunrise	Sunset
6th	03.45	20.13
14th	03.43	20.19
21st	03.43	20.21
28th	03.46	20.21
July		
5th	03.50	20.19
13th	03.58	20.13
20th	04.07	20.06

PLANETS (as at June 28th.)

	Constellation	Rises	Sets	Mag.
Mercury	Taurus	03.18	18.39	+2.2
Unfavourable				
Venus	Taurus	01.34	16.22	-4.2
Brilliant morning object in East				
Mars	Ophiuchus	19.09	02.16	-2.2
Visible throughout the hours of darkness.				
Jupiter	Taurus	03.12	19.31	-1.9
Unfavourable				
Saturn	Taurus	02.15	17.54	+0.2
Unfavourable				
Uranus	Capricornus	22.29	08.16	+5.7
Favourable				
Neptune	Capricornus	21.46	06.48	+7.9
Favourable				
Pluto	Ophiuchus	17.23	03.34	+13.8
Favourable				

PHENOMENA

Day	Hour	June
13th	18	Mars at opposition
14th	13	Jupiter in conjunction
16th	13	Mercury in inferior conjunction
18th	00	Venus 2° N. of moon
18th	10	Jupiter 4° N. of Mercury
19th	22	Saturn 0.9° N of moon
21st	00	Mercury 3° S. of moon
21st	03	Jupiter 0.7° N. of moon
21st	12	Total eclipse of Sun (Africa)
28th	06	Mercury at stationary point

July		
3rd	11	Mars 6° S. of moon
4th	14	Earth at aphelion (152 M. km.)
9th	18	Mercury at greatest elongation W. 21°
12th	22	Jupiter 2° N. of Mercury
15th	08	Saturn 0.7° N. of Venus
17th	13	Saturn 0.6° N. of moon
17th	18	Venus 0.3° S. of moon
19th	00	Jupiter 0.2° N. of moon
19th	23	Mars at stationary point

Minima of Algol

June Unsuitably placed.
July 11th 02.06 13th 22.54

Lunar Occultations

Times as at W.A.S. Observatory

Date	U.T.	Z.C.No	Mag	Phase
June	**h. m. s.**			
17th	02.36.06	291	6.8	reapp
25th	22.14.45	1545	8.0	diss
29th	21.32.34	2008	6.6	diss
July				
11th	01.46.03	3450	8.5	reapp
17th	01.45.46	620	6.1	reapp
19th	05.12.20	976	2.9	diss
19th	06.08.55	976	2.9	reapp
22nd	20.21.49	1485	7.1	diss
26th	21.38.49	1976	7.0	diss
26th	22.06.43	1978	6.6	diss

This is only about 30% of the predictions for the W.A.S. observatory. If you are interested there are some Occultations of Planets later in the year so get in some timing practise beforehand. Z.C. No. 976 = mu Geminorum

Planetary Report

Mercury. Is at inferior conjunction on June 16th therefore too close to the Sun for observation.

Venus. Morning object low in the east.

Mars. At opposition on June 13th, moving retrograde returning from Sagittarius into Ophiuchus.

Jupiter. Unsuitably placed, conjunction on the 14th

Saturn. Unsuitably placed throughout June, becoming favourable in July.

Uranus & Neptune. Are both suitably placed

Editors Note

Lets all cross our fingers and hope for clear skies (although the odds are better than Cornwall / Devon) for our friends and colleagues in Zimbabwe and Zambia later this month. For the rest of us why not take this opportunity to pen a short article for WAS News. Lets face it just what else would you be doing with your time during a beautiful June Summer's evening!!
Rob

Reports

Solar Section Report ~ May 2001

Brian Halls ~ Solar Section Director

The Sun remained active thru the first part of May. Region 9433 ($N17^0$ $L149^0$) which had been responsible for an active Sun during the last half of April disappeared over the western solar limb at the start of the month – dissipating as it went, however two large northern groups remained on the Sun - 9441 at $N06^0$ $L=078^0$ and 9445 at $N26^0$ $L=025^0$.

During this time, sunspot groups were predominantly northern hemisphere based. By 5 May, a number of active groups in the southern hemisphere rotated into view increasing the number of sunspot groups visible to 10. These spots were not of the same type as those in the north, which were extremely active. The southern spots were H-class groups – 'simple' monopolar spots with umbra, compared with the C, D, E and, F class spots with their magnetically complex structures in the north.

As the northern groups rotated off of the disk, activity quietened down for a day or two until a complex northern group rotated into view on 11 May. Region 9454 ($N12^0$ $L=232^0$) very nearly reached naked-eye visibility during its time on the disk and remained fairly constant in its size. It crossed the central meridian (CM) of the Sun on the 17 May. At the same time, and in the southern hemisphere, Region 9455 ($S16^0$ $L=276^0$) was fairly active – it was a long spread out group, earning itself a Fai classification because of its distribution in longitude.

It is likely that Region 9441 returned to view as Region 9461 ($N18^0$ $L=161^0$) about 16 May. It was now a quieter Dai class group during this period. Activity was again quiet as the number of sunspot groups diminished.

Sunspot numbers rose once more during the latter part of the month – Region 9463 ($N12^0$ $L=127^0$) reached naked-eye visibility on 22 May. Interestingly activity was fairly evenly distributed between north and south, though all but 1 of the 8 groups visible on the Sun that day were in the eastern side of the CM!

By 24 May there were 13 groups visible – making this time the spottiest for some weeks. This activity remained until the close of the month, when the number of groups visible fell sharply. Still, the northern solar hemisphere had slightly more groups and regions visible than the south.

Articles

May Lecture Reviewed by Vanessa Wegner

Observing Planetary Nebulae

Owen Brazell ~ Guest Speaker

Owen began his talk with a history of planetary nebula which surprisingly have only been discovered relatively recently. The first one was discovered by Charles Messier in the 1800`s. This was quite an achievement as Messier had to contend with smog & pollution in the middle of Paris. Messier listed in his famous catalogue M27, M57, M76 and M97 as Planetary Nebula. William Herschel was the next person to discover Planetary Nebula, having discovered Uranus he became rather bored & decided to find some more of these strange objects listed in Messier`s catalogue. He discovered the Saturn Nebula. It is thought that these objects are called Planetary Nebula because the Saturn Nebula looks rather like Uranus. Herschel`s son also scanned the heavens & between them they discovered about 80 of these objects. Herschel (senior) originally thought that if the nebula were observed with a large enough telescope they would all eventually resolve themselves into star systems, however upon discovering the Orion Nebula & observing the changes occurring he then decided that perhaps stars were forming in the nebula.

At the end of the 19th Century photography started to emerge & it was discovered that the spectra of stars could prove very useful in this area. Lord Ross observing with a 72 inch telescope felt that M27 could be resolved into stars. However William & Margaret Huggins applied spectroscopy in their observations & found that when looking at Draco the light was coming from gas & not stars at all. As the 20th Century moved on many more objects with emission spectra were discovered. In the 1950`s the first successful deep sky

survey was carried out, George Abel discovered 80 quite large planetary nebula through this survey. By the 1970`s many more were discovered by using radio wavelengths & Infrared wavelengths.

Owen then asked the question " so what do Planetary nebula look like?". Early images are not very detailed & usually show the objects as round but as the equipment became more sophisticated this was revealed to be incorrect, all that most Planetary nebula have in common is that they have an axis of symmetry. Owen showed some beautiful slides which certainly revealed the diversity & strangeness of planetary nebula such as M27, M76 which was originally thought to be two nebula and M97, nicknamed "the owl". The Eskimo can be seen inalmost any telescope. The Helix Nebula is huge, about half the size of the full moon, it also shows some interesting blobs, currently it is not known what they are. The Cats Eye clearly shows the central star which is blue which means it is very hot. The Egg Nebula is not understood at all well, it shows very strong polarisation which is highly unusual but it does mean that the resulting brightness makes it easier to be observed.

The obvious question arises, so what are planetary nebula? Stars like our sun are born, live & die, they burn hydrogen into helium but eventually helium will start to build up in its core & ultimately nuclear power will no longer be generated & it will start to lose mass. (The Hertzsprung-Russell diagram shows this life cycle clearly). As the core shrinks the suns outer layers will billow out & the sun will come 100 times its present size. (Red Giant) Eventually (about a million years later) the outer layers will have been blown out completely leaving the tiny collapsed core of the star - a white dwarf. The transition between a red giant & a white dwarf when the outer layers are gently puffed off is the planetary nebula stage. Planetary nebula don't last very long, about 20 to 30 thousand years. As there are so many white dwarfs in the cosmos it is thought this happens to most stars.

Owen suggested that if any of the audience want to observe planetary nebula they could try several sources to guide them such as the Messier Catalogue, the New General Catalogue (NGC), Sky Catalogue 2000 or Caldwell, although Owen described this last publication as his pet hate but did not say why! To help with finding the planetary nebula Owen suggested using a paper star atlas like the "Millennium" or if using a PC is preferred then the Megastar Guide is helpful. Photographic catalogues are also an option (Real Sky or DSS).

Owen`s talk gave the audience an in-depth understanding of these beautiful objects & his wonderful collection of slides was certainly an inspiration to observe Planetary Nebula for ourselves.

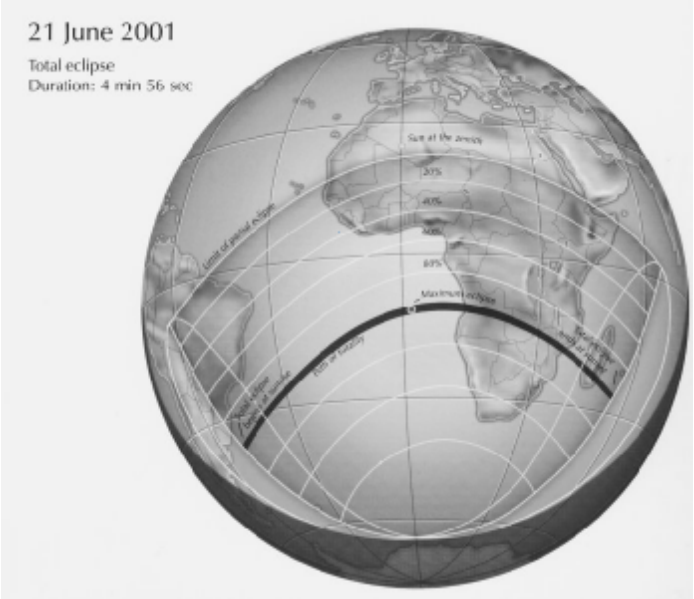
2001: An Eclipse Odyssey

Brian Halls

Many of you will be travelling across the equator to see the first eclipse of the new millennium later this month.

There is also a diversity of observing sites that will be visited, due to the number of different organised tours, these ranging from trips to Zambia and Zimbabwe to Madagascar.

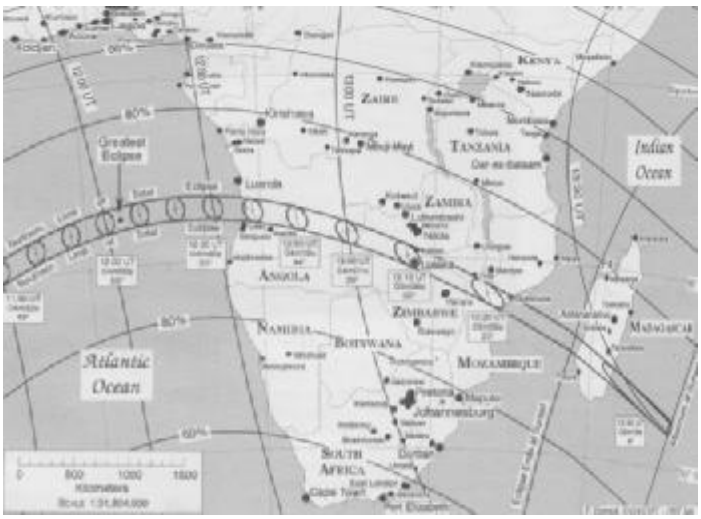
The eclipse begins at dawn off of the east coast of South America and tracks across the South Atlantic, eastwards to the southern African mainland. (Picture 1).



Just a little after noon universal time, just east of the Greenwich meridian line, the eclipse reaches maximum totality time – 4m 56s.

Travelling inexorably onward, the shadow of the Moon will cross the Angolan coastline south of Luanda about 40 minutes later. (Picture 2).

It will be mid-afternoon local time, when the eclipse is visible in northern Zimbabwe/southern Zambia (Picture 3) – maximum eclipse time will be between 3m 24s and 3m 09s.



The eclipsed Sun will set a 1000 km east of the coast of Madagascar.

Picture 1 from 'Glorious Eclipses – Their Past, Present and, Future' by Brunier and Luminet, published by Cambridge University Press.

SOLAR SAFARI

So! You are lucky enough to be going to Africa and plan to go on a hunt for the eclipsed Sun. Hopefully you will do plenty of shooting (with a camera of course), and bagging some 'big game' eclipse photographs to forever remind you of this once in a life time trip.

Here is a guide to help you.

Aperture	**5.6**	**8**	**11**	**16**	**22**
Chromospheres	1/4000s	1/2000s	1/1000s	1/500s	1/250s
Prominences	1/2000s	1/1000s	1/500s	1/250s	1/125s
Lower Corona	1/250s	1/125s	1/60s	1/30s	1/15s
Middle Corona	1/4s	1/2s	1s	2s	4s
Outer Corona	1/2s	1s	2s	4s	8s

The table above gives typical exposure times, for **100 ISO** rated film and different aperture ratio's of camera and telescopes, when photographing various atmospheric layers of the Sun. Remember, if you have an electronic camera, to set your camera to manual mode if necessary.

Good hunting!

William Who?

Graham W. Birdsall

According to research undertaken by Dr. Ruth Farwell, dean of academic affairs at South Bank University in London, William Kingdon Clifford, a professor at University College London, understood the basics of a relationship between space, matter and gravity in a leap of scientific imagination that shocked almost all of his contemporaries in the 1870s and was not equalled until Einstein published his own work in 1915.

Describing him as a 'visionary Victorian', Dr. Farwell said that professor Clifford may even have been on the verge of proposing full scientific theories to describe his ideas and carve out his place in history, but his work was cut short when he died from tuberculosis, aged 33, on 3 March, 1879 - just 11 days before Einstein's birth.

'Clifford was way ahead of his time and was anticipating some major parts of Einstein's work,' said Dr. Farwell, who added that Clifford's great achievements have been unfairly overlooked.

Her claims came after she had studied previously unpublished personal documents and Clifford's scientific papers.

William Kingdon Clifford excelled at mathematics, philosophy, literature and gymnastics. At the age of 18 he entered Trinity College, Cambridge and eight years later took up the chair of mathematics and mechanics at University College London. His contemporaries treated Clifford's ideas with hostility, not least because they judged him to be an eccentric.

While Clifford did once climb a Cambridge church steeple, his pursuit of scientific discovery almost cost him his life when he found himself shipwrecked off the coast of Sicily while on an expedition to study a solar eclipse. However, a mathematical system he created, known as Clifford algebra, is the first indication that Clifford may indeed have been on the brink of greatness, for that system is still used today by scientists exploring quantum mechanics, one of the main strands of modern physics.

But Dr. Farwell believes Clifford's most significant contribution to science was his suggestion that the way matter was moved by gravity could be explained by treating the universe as if it had four dimensions of curved space instead of the conventional three.

'All of the ingredients of Einstein's concept of space-time were there - this was quite unlike anyone else's ideas at the time,' said Dr. Farwell.

For two centuries, Sir Isaac Newton's picture of the universe had stood without serious challenge - until Clifford emerged on the scene.

Although Albert Einstein put the same concept at the heart of his theory of general relativity many years later, he achieved this quite independently of Clifford.

Indeed, Einstein was probably oblivious of his earlier research. Nonetheless, Einstein went one step further of Clifford in explaining that the fourth dimension was time and used it to accurately predict the orbits of planets.

However, according to Denis Brian, author of 'Einstein: A Life', for all his brilliance, Clifford could not rival Einstein's combination of genius and stubbornness.

'These ideas were in the air at the time, but all the great scientists agree - only Einstein could have pulled them together.'

Had Clifford lived longer he would have been able to develop his ideas and carve out a formidable reputation, claims Howie Firth, director of the Orkney science festival and a long-time supporter of Clifford's cause.

'As it was, his ideas appear in a key way in two of the great pillars of modern physics - relativity and quantum mechanics,' said Firth.

'Just imagine what might have been achieved if the mature Clifford had met with the young Einstein...'

What's on the Box

Thursday 14th June

BBC WORLD SERVICE

08.45, 22.45, & 04.45~2001: A Space Odyssey
William Roberts reads Arthur C Clarke's sci-fi classic

Friday 15th June

BBC WORLD SERVICE

08.45 & 22.45~2001: A Space Odyssey
William Roberts reads Arthur C Clarke's sci-fi classic

BBC TWO

06.00~Design for an Alien World
Following the Fortunes of a team of space scientists as they develop experiments to work on the surface of Titan, Saturn's largest moon.

Sunday 17th June

BBC KNOWLEDGE

09.00, 12.00 & 15.00~Journeys in Time and Space
(Searching the Heavens) Series exploring the birth and growth of the Universe. Chris Riley looks at the successor to the Hubble Space Telescope and finds out how ion engines will propel us into interstellar space.

5

20.00~Conspiracy Theory – Did we land on the Moon?
An in-depth look at the various claims which have been made suggesting theat the space race was an entirely political invention which didn't actually take place at all, and was sompley faxed to full the general public.
23.30~UFO's and Aliens
(Saucer Tech) Examining what it would take to travel beyond our Solar System.

Monday 18th June

BBC WORLD SERVICE

08.45, 22.45, & 04.45~2001: A Space Odyssey
William Roberts reads Arthur C Clarke's sci-fi classic

Tuesady 19th June

BBC WORLD SERVICE

08.45, 22.45, & 04.45~2001: A Space Odyssey
William Roberts reads Arthur C Clarke's sci-fi classic

Wednesday 20th June

BBC WORLD SERVICE

08.45, 22.45, & 04.45~2001: A Space Odyssey
William Roberts reads Arthur C Clarke's sci-fi classic

Thursday 21st June

BBC WORLD SERVICE

08.45, 22.45, & 04.45~2001: A Space Odyssey
William Roberts reads Arthur C Clarke's sci-fi classic

Friday 22nd June

BBC TWO

06.00~Mapping the Milky Way
How a century of scientific discovery has unveiled the secrets of the galaxy.

BBC WORLD SERVICE

08.45 & 22.45~2001: A Space Odyssey
William Roberts reads Arthur C Clarke's sci-fi classic

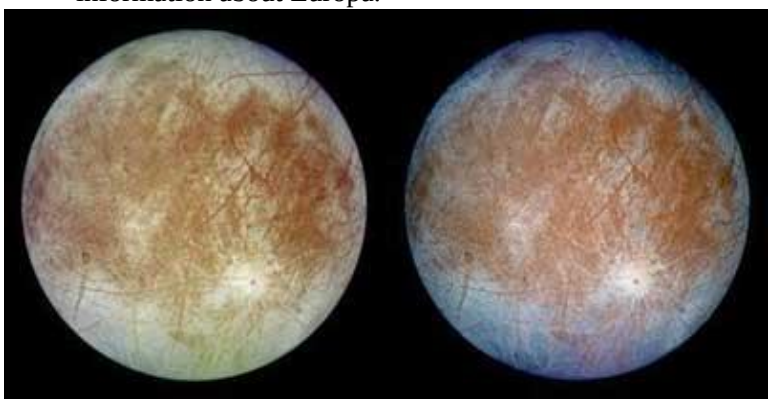
WAS News News

MIT researchers seek ocean on Europa through its sounds

Mit News Release

Acoustic techniques used by Massachusetts Institute of Technology researchers to explore the Arctic Ocean may help determine whether there is a vast liquid ocean under the ice blanketing Jupiter's moon, Europa.

MIT researchers reported Tuesday at the Chicago meeting of the Acoustical Society of America that they may be able to use a technique similar to ultrasound or the sonar navigation used by bats and dolphins to gather information about Europa.



MIT ocean engineering professor Nicholas C. Makris said that implanting soda-can-sized sensors in Europa's icy exterior could provide researchers with information on the temperature and structure of the planet. Current sensor technology makes it possible to detect even tiny motions, and there is evidence that massive ice fractures on Europa's surface occur daily.

While such an experiment may be a decade or more away, this unconventional approach to planetary exploration would have to begin to be developed now, Makris said. An array of geophones on the icy surface could simultaneously localize discrete events such as fractures and determine the moon's ice-layer thickness as well as the thickness of a potential ocean layer.

Searching for water

Europa may be the only entity in our solar system besides Earth that contains a great deal of water, researchers say, and this mission would represent the first time ocean scientists have been involved in planetary exploration.

Gravity and magnetic data collected by the NASA Galileo Orbiter over the past five years have provided

increasing evidence that an ocean exists underneath Europa's uniform, 10- to 100-kilometer thick coat of ice. The possible ocean on Europa may contain more liquid water than all the oceans on Earth combined.

Magnetic studies have indicated that there must be a conducting layer in Europa. A salty ocean would fit the bill. Researchers hope to discover whether Europa is made up entirely of mushy ice or if it contains an ocean. Where there is water, there may be life.
Using sound to"see" Pictures of the planet show odd, cusp-shaped cracks in the surface. Europa's numerous fractures and ridges are believed to have formed in response to tidal deformations generated by the moon's slightly eccentric 85-hour orbit around Jupiter.

Inspired by evidence for these regularly occurring ice fractures, the MIT researchers propose probing Europa's interior by deploying an array of surface microphones that listen to naturally occurring sound. Knowledge of ice mechanics suggests that these propagating fractures would generate significant acoustic energy in the frequency range 0.1-100 Hz.

Studying the ice sounds would allow researchers to see if there was a connection between the moon's orbital period and the ice fractures, which occur on Europa once every 30 seconds. Meteors impact Europa about once a month and these also could be used as sound sources.

An Arctic exploration
MIT researchers led by Makris, Doherty Professor of Ocean Utilization in MIT's Department of Ocean Engineering, have used sound-based techniques to explore the Arctic Ocean. By inserting vibration-sensitive hydrophones in the water, researchers used ambient sound to listen for changes in noise levels. They found that noise levels increased when winds and currents put stresses on the ice.

"Noise levels are like a thermometer for stress on the ice," Makris said. "The ice is very sensitive and conducive to sound." Sound waves made by large fractures go through the ice and penetrate into the ocean.

These low-frequency sound waves, akin to those created by whales, get trapped and can propagate hundreds of kilometers through the water. Even if they can't be heard, instruments can pick up their vibrations from a distance.

In addition to Makris, the research team includes ocean engineering postdoctorate associates Aaron M. Thode and Michele Zanolin and graduate students Sunwoong Lee, Purnima Ratilal and Joshua Wilson.

This work is funded by the Office of Naval Research. Makris is the Secretary of the Navy/Chief of Naval Operations Scholar of Oceanographic Sciences.

Diary

June 13 – WAS Monthly Meeting – The Sloan Digital Sky Survey by Dr Jon Loveday. (University of Sussex)

June 21 – First total solar eclipse of the millennium.

July 7 - BAA Exhibition Meeting - London Guildhall University.

*All monthly meetings (**bold**) are held at the Heene Church Rooms, Heene Rd, Worthing @ 7:30pm*

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