

SCORPIO

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The Astronomical Society of Frankston was founded in 1969 with the aim of fostering the study of astronomy by amateurs and promoting the hobby of amateur astronomy to the general public. The society holds a General Meeting each month for the exchange of ideas and information. Regular observing nights, both private and public are arranged to observe currently available celestial objects. In addition the Society provides the services of its members for educational presentations or observing nights for schools and

MESSAGE FROM EDITOR

I must apologise for the lateness and brevity of this issue of Scorpio but time constrains (one must work for his supper) have limited my researches to a few interesting articles. I am always on the lookout for contributions or articles members may find interesting. Why don't you help out by picking a subject, object or interest, doing some general reading to explore it then write a short

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ASTEROID UPDATE

At the 15th National Australian Convention of Amateur Astronomers, Dr Duncan Steel presented a paper about the search for near Earth asteroids. In particular the Earth threatening asteroids need study to assess the potential risk from large meteor impacts. Astronomers from the University of Arizona have been carrying out a survey of small asteroids and have concluded the Earth is struck on average by a 30 - 100 metre asteroid every century. About five objects at least 10 metres across would strike the Earth each year. This large number of objects could not be the remnants from the Solar System formation because the planets would have been gravitationally swept them up long ago. There must therefore be a constant supply of new objects. The most likely sources for these new objects are the fragments thrown off catastrophic collisions in the asteroid belt. The survey suggests the number of potentially dangerous objects coming our way may be higher than previously thought.

JULES VERNES RIGHT AGAIN??

In one of Jules Vernes sci-fi novels a monster cannon blasts a projectile to the moon using the new explosive X. While not recommended for human travelers such a launch method may not be all that impractical. A new patent has been lodge in Europe to launch satellites using a large supergun. The massive cannon would consist of several sections concreted together. A series of explosive charges are fired in sequence just behind the projectile thereby controlling its acceleration as it moves along the barrel. The device might be useful for launching sub-orbital devices or re-stocking orbital platforms such as the Space Station.

I wonder if Jules Vernes patented the idea first.

Meeting Venue:

The Peninsula School
Wooralla Drive, Mt Eliza
(Melways Map 105, F5)

Room F6 at 8.00pm on the third Wednesday of each Month except December/January

Visitors are always welcome

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WHAT'S NEWS IN ASTRONOMY

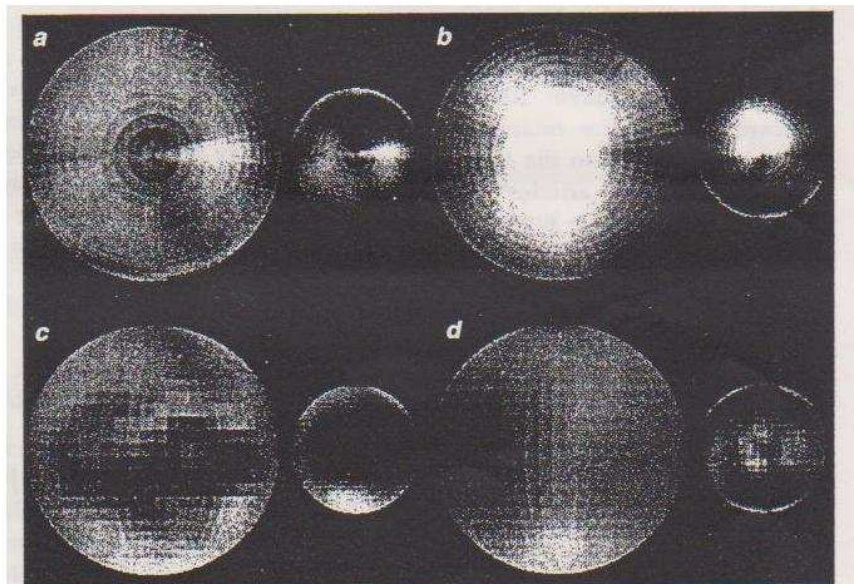
MILKY WAY PICTURE

Early this century, astronomers began to understand the structure of galaxies. They estimated the size of our galaxy from the distribution of globular clusters and deduce the approximate position of our star Sol about the galactic centre. Radio and far infrared surveys showed the basic distributions of gas and dust. What our galaxy looks like visually however has been the subject of much conjecture. It is impossible to see the centre of our galaxy because dust between the stars absorbs the light. The first picture (shown below) to show how the stars are distributed in the Milky Way have been taken by the NASA Cosmic Background Explorer satellite. The image combines the data taken at three wavelengths: 1.2, 2.2 and 3.4 micrometres. The image shows stars in the galactic disc as well as the central bulge. This confirms our position 28,000 lightyears from the centre.

TEKTITES and DINOSAURS

It is generally accepted that a large meteor or asteroid struck the Earth some 65 million years ago, triggering a mass extinction of life on the planet including the demise of the dinosaurs. The impact site is thought to be in what is now the Caribbean Sea. While the evidence has been building up, it has been hard to get absolute proof of the event. Tektite material collected from Haiti seem to have overcome this absence of proof. The glass spherules can be generated by meteorite impact and Haitian tektites vary from less than a millimetre upto 10 mm across. Samples of these tektites have been dated using a technique called single crystal laser fusion dating. The samples were dated at 64.5 ± 0.1 million years and additional tests confirmed the tektites had not been geologically affected since they were deposited. This is the first direct evidence of the impact debris and the precise dating has provided direct confirmation of a meteoritic impact 65 million years ago.

During 1985 to 1990 the planet Pluto and its moon Charon engaged in a series of mutual eclipses made possible by their orientation relative to us inner solar system dwellers. Pluto and Charon align as seen from Earth and therefore Charon appeared to move in front of and behind Pluto once every 6.4 days. This alignment happens every 120 Earth years. By monitoring the varying brightness of the combined planets, it has been possible to produce the first detailed maps showing the general surface features of each planet. The maps show Pluto is dark at mid latitudes, brighter at it's North pole and white at the South pole. The South pole has a 98% reflectivity. This suggests there is some form of weather on Pluto. The South pole is currently in moving it's the Plutonian winter. It may be possible that during the northern Plutonian summer methane gas sublimates from the surface and refreezes onto the gradually cooling South pole. This new methane frost would be like fresh snow. The winter will last 124 Earth years. Charon on the other hand is generally darker than Pluto and in some regions the surface is as black as coal. It is though Charon's' lower mass is insufficient to retain significant methane and so no frosts are possible. Now that the current series of eclipse have finished our next opportunity to study the surface of these planets will be either a space probe early next century or high resolution pictures from a revitalised Hubble telescope.



RECONSTRUCTED IMAGES of Pluto and Charon depict the bodies as seen from the north (a) and from the south (b). Marc W. Buie of Lowell Observatory and his co-workers inferred one set of hemispheres from eclipse data (c) and the other (d) from cruder observations of rotational light curves.

NEPTUNE RING ARCS

One of the surprising discoveries this century is the realisation that all the major planets have rings. While Saturn has beautiful rings visible in any telescope, the other planetary rings have only been detectable by special instrumentation. The most noted is the spacecraft Voyage 2. When Voyage 2 flew past Neptune in 1989 it revealed a string of ring-arcs. These ring arcs are material concentrations at gravitational resonances with the other Neptunian moons. Astronomer believe these ring arcs are not permanent feature and should slowly disperse over 10-100 million years. It is believe the current ring-arcs formed from a collision of a past moon with so other object.

SOLAR ACTIVITY IN PRECAMBRIAN TIMES

In 1843, the German amateur astronomer Heinrich Schwabe discovered the 10 year sunspot cycle. His announcement triggered a series of researches designed to elucidate the underlying reasons for this cyclic behaviour and its possible consequences for us on Earth. The sunspot cycle is now firmly established and additional cyclic activity has been found in solar flares, solar magnetic fields, the solar constant and solar radiation across the spectrum including cosmic rays. All these variations are known collectively as the "solar activity cycle". The cycle is not strictly periodic but varies from 9 - 14 years. In recent times, connections between the solar activity cycle and world climate have become more apparent although very difficult to detect. Connections have been sought in such things as tree-rings, glacial geology, crop harvests, coral growth rings, Antarctic ice cores and even the stock market records. (I could name a few business men who had too much exposure) Clear cut connections have been very hard to find and it has only been in the last few years that true climatic effects seem to have been proven. One such connection has been found approximately 200km North of Adelaide at a place called Pichi Pichi Pass where a geological record seems

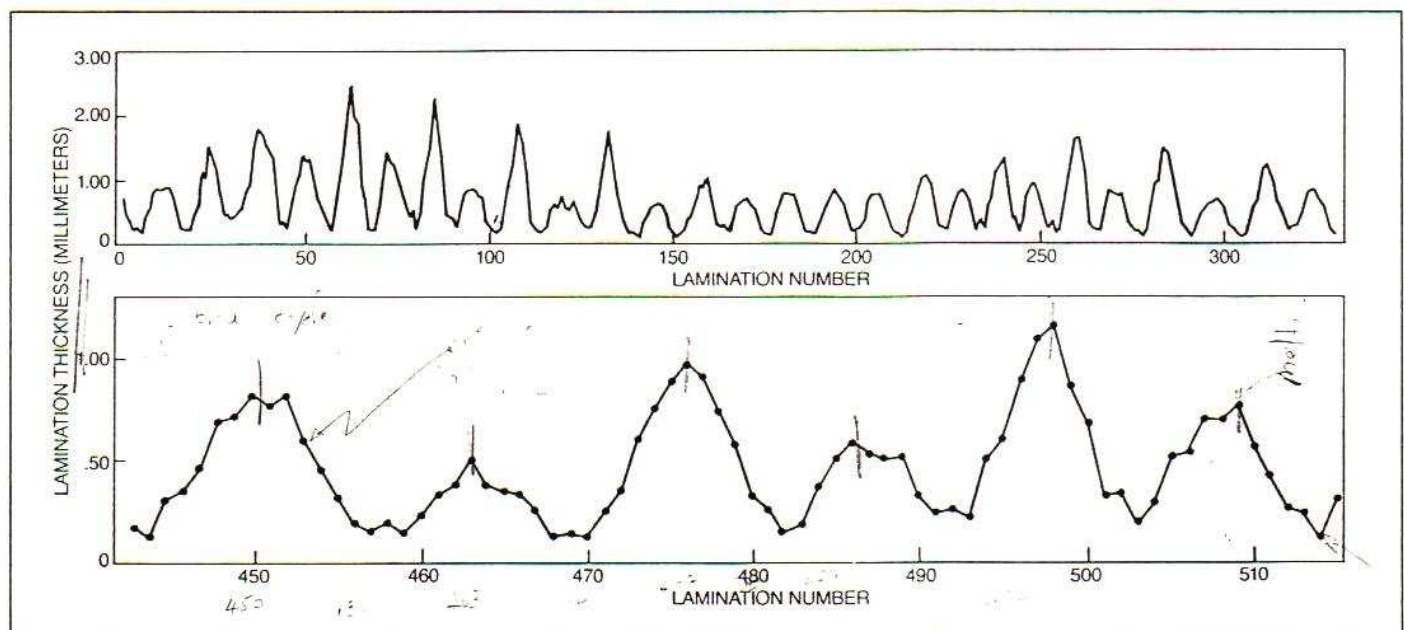
to show the solar activity cycle in full swing over 700 million years ago during the late Precambrian era.

The world was a very different place 700 million years ago from the one we know today. Neither animal nor plant life had yet come up out of the sea onto the land. The world was in the grip of a severe ice age and the region around Pichi Pichi Pass consisted of a series of lakes receiving melt water each season. This melt water carried with it fine sediment deposited as successive layers of silt onto the lake bottom. Since that time the lake bottom has lithified into a series of siltstone laminations fossilising any variations in annual silt deposition. For reasons not fully understood the Pre-Cambrian solar activity was strongly influencing the volume of melt water produced each season and thus a study of these sediments should provide a view into the general temperature changes from season to season.

With the help of the CSIRO, Dr.G.Williams has studied a 10 metre core taken from this siltstone laying open a record covering some 19,000 year's duration. Dr.Williams has named the ancient lake that produced the core Lake Elatina. Detailed analysis of this record reveals a long series of cyclic changes.

The thickness of each layer (or lamination) is a measure of the amount of material deposited each season. Obvious in the record is an approximate 12 year cycle consisting of an average 5.57 years rise time and 6.45 years fall. The actual cycle duration ranges from 9 - 14 years. The strongest cycles occur about every 26 cycle periods or 314 years (actual range 275 - 335 years) while the longest duration cycles occur about every 13 cycle duration's or 156 years. Both these characteristics (strongest and longest cycles) seem to be negatively correlated. That is the strongest cycles tend to be short duration while the weakest intensity cycles tend to be long duration. The record also includes a series of harmonic cycles associated with the base 314 year period. There is also evidence of a "sawtooth" effect where high intensity cycles alternate with low intensity ones. Comparing these characteristics with what is currently known about the sunspot cycle is strong evidence that these siltstone laminations are an accurate record of solar activity 700 million years ago.

This unusual record is quite remarkable in what it tells us about our Sun's activities. Firstly it provides strong support for the self sustaining dynamo model of sunspot



activity. This model argues that solar activity is the result of continuous and self sustaining interactions between magnetic fields and convective currents within the solar structure. Other models predict stronger activity in the past and a slow, steady decline in overall activity. The Elatina formation shows that the Solar Activity Cycle has not changed in some 700 million years. Our incomplete record of the contemporary sunspot cycle extends from the 17th century and suggests a few minima in the solar activity. The strongest of these minima is the so called Maunder Minimum when during the period 1620 - 1700 very few sunspots were observed. This coincided with an unusually cold period called the Little Ice Age and there is still argument about any connection between it and the sunspot cycle. Throughout the Elatina record there are deep minimums in the cycle intensities on average every 314 years but never is there a cessation of activity similar to the Maunder Minimum. This suggests, the Maunder Minimum is not a real effect and is a consequence of insufficient data from the 17th century observations. The result from studying the Elatina record further suggests a possible scenario for future solar activity. Assuming the 1975 peak corresponds with the maximum of the 314 year periodicity, future solar activity should show an overall decline into a deep minimum over the next 9 - 10 cycles and the duration of each cycle should be slowly increasing. An increase in cycle duration will be accompanied with a decrease in overall intensity of the activity.

I guess this means amateur astronomers over the next hundred years or so can only look back to the good old days of the late twentieth century when solar activity was at its

