

**Report of October Meeting
Royal Society
Southern Highlands Branch**

Speaker: Dr Ken McCracken

Topic: The Sun Goes on Strike

Dr Ken McCracken was welcomed by an audience of 77 when he arrived to address the October meeting of the Southern Highlands branch at 6.30pm on October 15th in the Drama Theatre, Frensham School, Mittagong.

Ken McCracken made it clear that most of the research he was about to present had been done in the past three years, and that new discoveries were being made month by month, making this a very exciting time for solar physics. The lecture that followed detailed the cyclical activity of the sun, as demonstrated by its sunspots and other behaviours, and their relationship with global climate records.

Four hundred years ago, Galileo noted a very “spotty” sun, and concluded from his observations that the sun rotates about its axis every 27 days. Sunspots are regions of extremely high magnetic field that may occupy an area of diameter ten times greater than that of earth. The magnetic fields are very unstable, resulting in enormous explosions called solar flares. The magnetic fields result from the fact that the equatorial regions of the sun rotate faster than the polar regions.

Sunspots exhibit an approximately 11 year cycle, each characterized by a well defined maximum and minimum level of activity. When a sunspot minimum was reached in September 2006, it was anticipated that a new cycle would begin in early 2007. NASA and others predicted it would be “the biggest ever”. However after the disappearance of the sunspots in late 2006, new spots failed to appear. As at the date of the lecture, there had been 735 days without sunspots during this latest minimum compared to 485 in any recent sunspot minimum.

The sun has exhibited this type of behaviour before. From 1600 to the early 1700s, in the time known as the Maunder Minimum, sunspot activity ceased to be a cyclic phenomenon. Again in the early 1800s, the reduction in sunspot activity led to this period being known as the Dalton Minimum. Both of these periods coincided with Little Ice Ages. It is now known that the sun has been inactive 22 times during the last 10000 years.

Sunspots are just one result of the magnetic fields of the sun. Less well known, but very important for the climate of the earth, are their companions known as the faculae, the solar network and the “super granulation”, all readily observable features on the sun. With sunspots alone, the sun would get cooler when there were many sunspots. However satellite measurements indicate that the sun in fact gets hotter. Dr McCracken explained that the faculae and the solar network provide an explanation for this apparent anomaly. They are able to make up for all the heat lost because of the sunspots, and then some.

In summary, Ken McCracken said that since 2006, solar magnetic fields have been decreasing, cosmic radiation intensity is increasing, and the heat output of the sun is decreasing. He stated that we have never seen anything like this before!

As for the implications of these findings on our future climate, Ken McCracken believes that if we are going into several cycles of low solar activity, then the reduced heat output from the sun may lead to several decades of climate cooling. However, over the longer term, the solar heat output will return to its previous levels, and then the 2200 year solar activity cycle will reinforce the man-made effects on the climate to further accelerate the warming of the earth.

At the conclusion of the lecture, Dr Ken McCracken answered as many questions from the audience as time allowed. The vote of thanks was given by Anne Wood.

Anne Wood