Report of 19 July 2018
Royal Society
Southern Highlands Branch

Speaker: **Dr Ken McCracken D.Sc.AO**

Topic: **The Ice Ages – Big and Little**

For many millions of years, earth has experienced a series of periods of glaciation. In the big ice ages, temperatures have been 10 degrees cooler over periods of approximately 90,000 years. The little ice ages have seen temperatures 2 degrees cooler over periods of 40-100 years. Five of these have occurred in the last 1000 years.

During the big ice ages, the northern polar ice sheet extended to about the locations of London and Los Angeles, and the sea level was 100m lower in the rest of the world. In between these ice ages or glacial epochs, there have been warmer periods of duration 10,000 to 15,000 years, the inter-glacials, similar to the climate the earth has experienced for the last 10,000 years. In addition to these big ice ages, there have been 26 little ice ages during the 10,000 year interglacial era we live in. Each has persisted for 40-150 years. The best known are the *Spoerer* and *Maunder* little ice ages of 1428-1540 and 1645-1715 respectively. They caused much starvation and death in Europe.

Ken McCracken then turned his attention to the models and theories that are currently being explored to explain the periods of glaciation that have been observed over eons of time. Much of the data being used to study correlations in observed patterns has come from ice core studies and currently from satellite data, a field in which McCracken continues to be deeply involved. In his latest work, he has revisited the Milankovitch theory which for about 50 years lay largely ignored,

According to the Milankovitch theory, temperature variation records on earth going back over 400,000 years are closely correlated with changes in the geometry of the earth's orbit. These changes in geometry of the earth's orbit are due to three main factors, eccentricity, obliquity and precession, which could be loosely regarded as wobbles and deviations of the earth in its orbit around the sun. McCracken believes that these phenomena are instrumental in big ice age occurrence.

As for little ice age occurrence, McCracken believes that they are a consequence of small variations in the amount of heat radiated by the sun, each corresponding to a period when there were very few sunspots. Right now, the sun is not making many sunspots, and McCracken states that we are in a very weak little ice age.

The conclusion to this lecture was unforgettable when Ken McCracken asked what factors could be causing the correlations between big ice ages with earth's orbital variations, and little ice ages with lesser sunspot numbers. He answered his own question with the statement, "It is the planets that do it".

He proposes that in the case of the Big ice ages, the planets manipulate the orbit of the earth depending on the relative positions of their orbits around the sun. In the case of the Little ice ages, again due to the relative positions of the their orbits, the planets drive a magnetic amplifier deep inside the sun that creates the sunspots, and that in turn results in the observed smaller climatic fluctuations.

The conclusions reached by Dr Ken McCracken were presented in this Royal Society Southern Highlands lecture for the first time in public. The 90 person audience broke into spontaneous applause.

Anne Wood FRSN