Geography Group - 17th March Talk on "A Journey Through Time" presented by Prof Mattias Green. Report by Phil Johnson

The initial thoughts in undertaking this write-up was to do a full-scale report. However, given the complex and far reaching nature of the talk and that a full recording is still available via Zoom, few short sentences will have to do.

I have started in reverse; this 15 year project with Mattias as lead, has a publication out towards the end of the year with a possible title "A tidal journey through Earth's History". Mattias has said he will let me know closer to the publication date what the title will be and presumably the publisher although he said pre-order cost would be the price of a kidney – hope he was joking!

As he indicated in his talk it was a couple of facts as regards tides and the Moon that didn't match that prompted this 15 years' worth of discovery and that Darwin was wrong. Not Charles, but Sir George Howard Darwin KCB FRS FRSE; 1845 to 1912, (Charles' second son), barrister and prize-winning astronomer who in his excellent books and articles on Earth's tides had estimated that the moon was aged about 1.5 billion years (The "fission" theory of the earth-moon evolution) versus that of the rock returned by the Apollo 15 crew which when analysed to be some 4.4 billion years old. This old theory was based on the Moon-Earth distance (and Earth's Day-length) based on the estimated energy loss from the resistance of the tidal flows to the spinning motion of the Earth and Moon combined system around this mean centre of gravity. Mattias put it simply as a spinning ice-skater; the speed of the spin depends if the arms are outstretched or held close to the body. Attempts using a pedestal chair should be frowned upon!

Mattias started by outlined what are tides, how are they formed and their daily cyclic life. Based on that last data and using computer modelling to then estimate the energy consumption of tidal resistance and the effect of the whole energy system on the rotating masses of the Earth and Moon, to give the age of the system. The outcome was to reconcile the radioisotope dating of those returned rocks to that by examination of the tidal data. George of course couldn't have reckoned on lunar exploration by man and the return of lunar rocks, or satellites measuring tides and ocean depths from space.

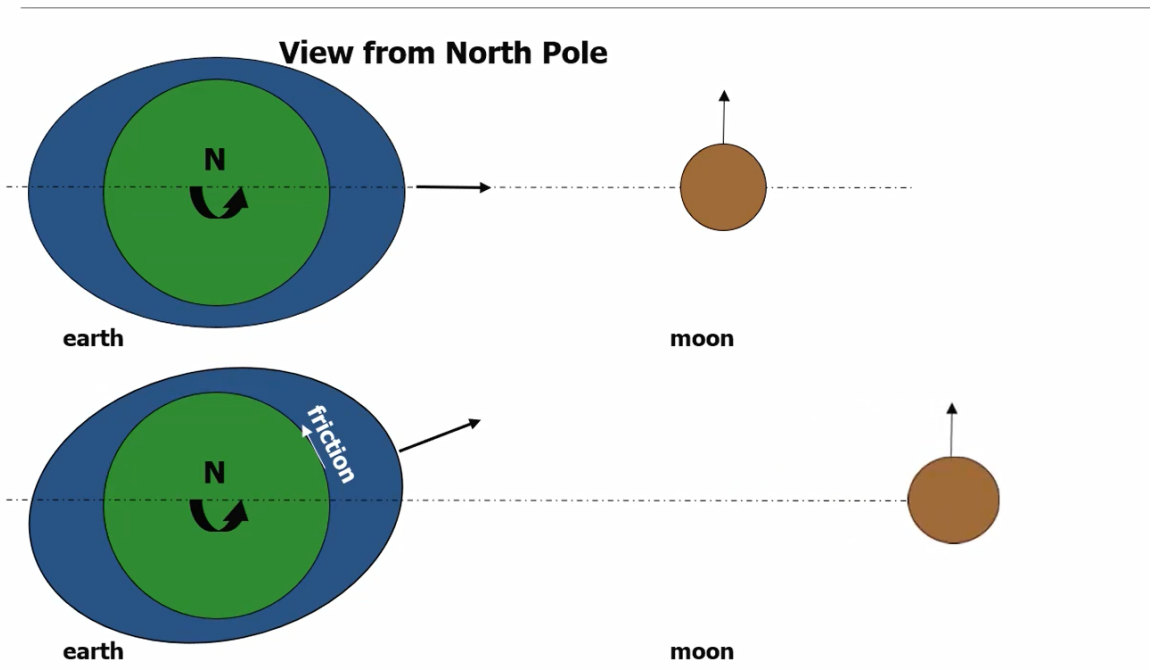
In the talk Mattias presented a animation clip of the tectonic changes to earth's topography from some 400 Mya to present day which encompassed the formation and loss of the super continent Pangea. As he pointed, out this sort of work alters one's perception of time, the clip by Dr Clara Matthews, in which her 3 years study culminated in a 1 minute

18 seconds presentation! The calculation be George Darwin was made without our present knowledge of Earth's supercontinents, the last being Pangea. The modelling showed that a compact supercontinent produced less tidal resistance and hence the Earth-Moon distance altered very little

The talk concluded by looking at the possible future movements in tectonics and our current land masses, the value of tides and ocean currents in our climate (important for fish stocks and the regulation of Earth's temperature) and to look back in time to study the other 2/3 of earth's history, currently rock cores are being taken of ancient tidalytes rock formations so to have a better understanding of the whole system across the 4.6 billion years of Earth's existence.

Next meeting is on the 21st April, 2pm at the Witham. The meeting is based on series of small presentations based on "The tales from the Map room".

I also think there are a few places left for the special arranged visit to Raby Castle on the 17th April looking at the map archives.



Conclusions

There is a supertidal cycle associated with the supercontinent cycle

The tides can vary a lot on “short” time scales

The moon Moon is old