

Issue: April 2018



Ayrshire Astronomical Society Newsletter

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Moon Phases April / May 18

22th First Quarter
30st Full Moon
8th May Last Quarter
15th New Moon
22nd First Quarter
29th Full Moon

Next Meeting:

23rd April 2018

7pm

At the Prestwick Academy

Guest Speaker

Dr Simon Cuthbert

'Mascons, Maria and Magma Oceans:

The Geology of the Earths Moon'

AGM meeting 21st May 2018

Please read the President's word for more information.



Photo taken by March Charron at the SDSO, 15th April

President's Word

AGM 21st May 2018

Following a committee meeting held on the 16th April, it was decided that the 2018 AGM will follow a similar but slightly different form to that used in the last couple of years. The reason for this is partly that the AGM process itself is expected to take a little longer than it has previously as; several changes to the constitution will be proposed; we have a Data Protection and Privacy Policy to adopt; and the election of the committee will not be the usual block vote to re-elect last years incumbents. This latter being due to the "retirement" of Derek Oldfield from the position as Treasurer, my own "retirement " from the position of President and the happy situation that we have a number of new candidates for committee members. The other reason is just to have a change!

So, the AGM evening will commence as usual with the administrative matters that need to be voted upon at an AGM, followed by the election of the new committee. After which there will be a buffet and soft drinks followed by a fun, team based, interactive, space oriented activity. Don't worry there will be no running about or embarrassing stand ups required!!

Please put the AGM date in your diary – 21st May – and make sure that you come along and have your say in the running of the Society, not to mention a free buffet and a laugh.

There will be more detail as to the changes in the May newsletter should you wish to delve into them before the AGM.

I look forward to seeing you there and at the April meeting of course.

News and Events

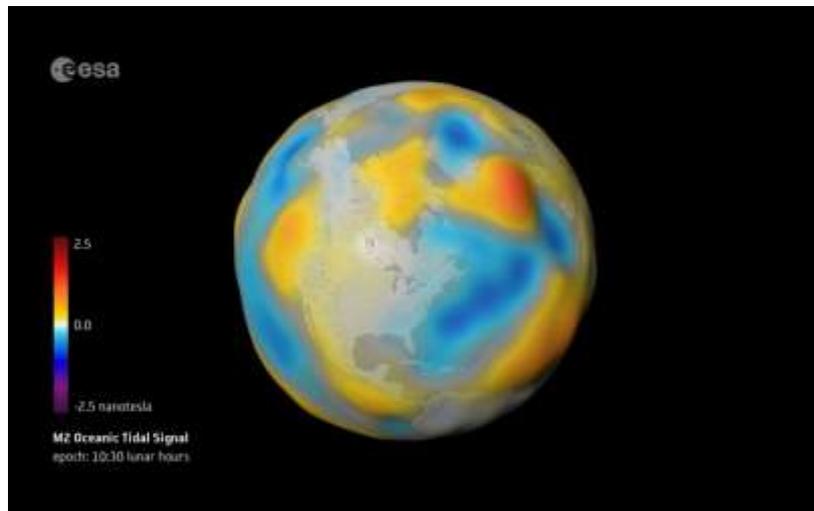
Ocean's Mysterious Magnetic Field is mapped in stunning detail from Space

To learn more, the European Space Agency (ESA) directed three identical spacecraft, which the agency launched in 2013 and collectively calls Swarm, to map the mysterious magnetic field emanating from the ocean's tides.

The new research, as well as the digital 3D map it helped create, is providing new insight into how the protective, cocoon-like magnetic shield is generated, as well as how it behaves and changes over time.

The magnetic field — that is produced by the oceans, the molten core and rocks in the crust and upper mantle — protects the planet from streams of charged particles known as the solar wind. If these charged particles weren't deflected by the magnetic field, they could jumble the navigation of satellites and aircraft and even interfere with electrical power grids, University of Leeds geophysicists Phil Livermore and Jon Mound wrote in an article for The Conversation. Not to mention, the radiation could wreak havoc on human health.

To get a better handle on the forces contributing to this field, the researchers had Swarm map the oceans' contributions to it with remarkable precision



The researchers chose to focus on the oceans because they make a tiny, but important contribution to the Earth's overall magnetic field. The salt within seawater can conduct electricity. And oceans don't remain still; rather, they move in cycles, up and down. As the tides cycle through the world's oceans, that salty water essentially tugs on the magnetic field above our planet.

The magnetic field generated by the oceans is quite small. It's about 2 - 2.5 nanotesla at satellite altitude, which is about 20,000 times weaker than the Earth's global magnetic field

The newly analyzed data will give researchers a more nuanced view of how the oceans are affected by climate change. To understand our changing climate, it is important to track how the heat which is absorbed by the oceans is being distributed and stored.

Outreach Events Dates

We are looking for volunteers to participate at various events.

5th May, Cars on Campus in Kilmarnock

27th July Dumfries House

These are fun days out where you interact with people of all ages. We have a range of telescopes set up, books and all sorts of accessories on display. Speak to one of the committee members if you are interested. Everybody is welcome!



Alan Mathison Turing OBE FRS (1912- 1954)

Presented by

Dr Paul Cockshott, University of Glasgow

**Tuesday 29th May 2018, 6.30-9.00 pm, Assembly Hall, St Joseph's
Academy, Grassyards Road, Kilmarnock KA3 7SL**

This special evening will celebrate the achievements of the world famous code breaker, Alan Turing. The evening will start at 6.30 with a showing of the documentary "The man who cracked the NAZI code - The story of Alan Turing". At around 7.30 there will be a 20 minute break whereupon soft drinks will be served. After that, Dr Paul Cockshott of Glasgow University will tell us more about the impact of Turing's works and ideas and in particular Turing's novel approach to the Decision Problem of Hilbert, the idea of the Turing machine and how it worked and much more.



Alex's Space



To Buy or Not to Buy

New or Used? Is usually the next question! At any one time there are hundreds of bargains to be had in the UK used telescope market. You might wonder why anyone would part with their much loved telescope, and there are a variety of reasons. A common one that I have heard when on one of our outreach visits is that the seller was unable to 'master' the set up or controls of the telescope. In particular this occurs with equatorial mounts and also with the computerised 'go-to' scopes. Sometimes, of course, the seller is simply trying to raise capital to upgrade to a larger or better instrument.

Well established telescope manufacturers like Celestron, Meade, Orion, Skywatcher or Vixen are generally considered to produce good quality instruments, so, all things considered, it is reasonable to feel confident when buying them on the used market, assuming that they have been reasonably well cared for. Before purchasing, it is always a good policy to actually see the items and in particular inspect the optics. In addition check the sale description to be certain what is included and what may be missing for example; eyepieces, type and size, finder scope, star diagonal, type of mount and balance weights and any other accessories.

In general, when considering a telescope, for a refractor an objective size of 70mm should be considered a minimum and for a reflector, a 150mm mirror diameter. Alt – Azimuth mounts are generally easier to set up, but equatorial mounts, once mastered, are easier for a star tracking and essential for anything but the most basic imaging. Any mount should have a simple secure clamping method for each axis and also slow motion controls. Motor driven mounts, even if only in right ascension can improve the quality of a night observing.

Before making any purchase it is always worth considering what is used by your fellow astronomers or, if you are completely new to astronomy, calling in at your local astronomical society for help and guidance. The same of course goes if you already have a telescope and are having difficulty getting to grips with it. In the case of AAS we often help non-members and we also have a range of club equipment for loan to members or for demonstration purposes – just ask.

Finally, remember, in any buying situation CAVEAT EMPTOR!! – make sure you know what you are getting before parting with your cash.

Alex

Marc's Space

The Parsec

SPOCK: Leave channel one open, Lieutenant, just in case.

UHURA: Aye, aye, sir.

MCCOY: What are you going to do, Mister Spock?

SPOCK: I'm going to wait, Doctor. There's little else I can do.

MCCOY: What about the Captain?

SPOCK: If I could help him, I would. I cannot.

MCCOY: Now, you're the one that's always talking about logic. What about some logic now? Where's the Captain, Mister Spock?

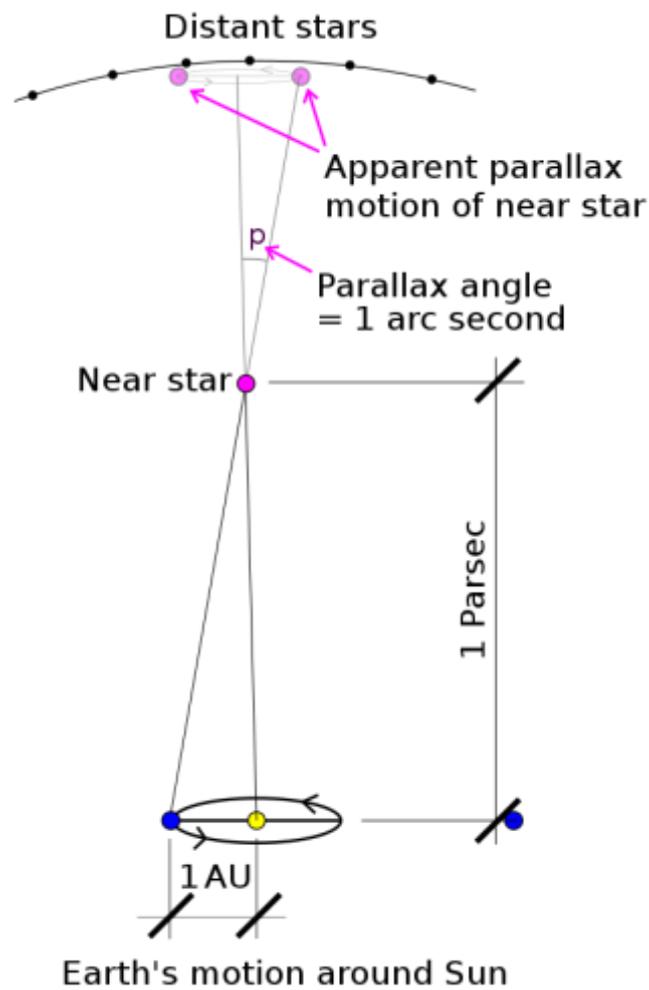
SPOCK: He's out there, Doctor. Out there somewhere in a thousand cubic parsecs of space, and there's absolutely nothing we can do to help him.

- *From Star Trek Arena, the original series (<http://www.chakoteya.net/StarTrek/19.htm>)*

When I saw this as a boy, I had no idea what a parsec was, but it sure sounded pretty cool. Even though the writers of the series played a little fast and loose with the term, we knew it was a measure for a long way in space. I had to get a bit older to realise just how big it really is.

Before discussing parsecs, a quick review of arcseconds is in order. We all remember that a circle has 360 degrees, each degree is made up of 60 minutes (arcminutes), and each minute 60 seconds (arcseconds). To get an idea of the scale, the moon is about 30 arcminutes across, which is roughly equivalent to 1,800 arcseconds. On the other hand, Mars can vary between 3.5 and 25 arc seconds in diameter, Jupiter from 30 to 50, and the components of double star Mizar in Ursa Major are about 14 arcseconds apart. A good test for telescopes, three inches and up, is the star Izar (Epsilon Boötis) at 2.8 arcseconds. A five inch should be able to resolve to one arcsecond, whereas a 14 inch can reach about a third of an arc second. Without resorting to adaptive optics or other techniques, the effects of the earth's atmosphere make it difficult to obtain much better resolution. Outside of it, the Hubble Space Telescope has a resolution of about 0.05 arcseconds.

The term "parsec" goes back over a century and was coined by British astronomer Herbert Hall Turner in 1913 and is defined as: "the distance at which one astronomical unit subtends an angle of one arcsecond," (Wikipedia). Perhaps this picture saves a thousand words:



Source: Wikipedia

This distance has been further refined to be $648,000 \text{ AU} / \pi$, which is equivalent to about 3.26 light years (ly). Professional astronomers prefer to use this over light years as it is based on a physical measurement. In contrast the general public, and likely most of us, prefer light years. From the earth's surface the largest telescopes using techniques such as adaptive optics or speckle interferometry can measure angles as small as 0.01 arc seconds, which while impressive, still limits measurable distances to about 100 parsecs (pc). In 1993 the European Space Agency (ESA) launched the Hipparcos satellite that measured about 118,000 stars with an accuracy of just under one milli-arcsecond, or out to over a thousand parsecs (>3,260 ly). ESA's follow-up Gaia Satellite was launched at the end of 2013 aims to measure one billion stars up to distances of 8,000 pc away (26,000 ly), plus or minus 10%, which is as far as the galactic core. It is able to do so by having a 20 micro arcsecond resolution (0.000020 arcseconds).

Astronomers also use larger units like the kiloparsec (kpc), the megaparsec (Mpc), and the gigaparsec (Gpc) the first for distant objects in or near our own galaxy, and the second for objects out to about a billion parsecs, and the third for objects out to the edge of the visible universe.

Some distances in parsecs

Proxima Centauri	1.3pc or 4.24ly
Pleades	130pc or 420 ly
Great Cluster in Hercules (M13)	6.8kpc or 22kly
Andromeda Galaxy	0.78Mpc or 2.5M ly
Virgo Cluster	16.5Mpc or 54M ly
Edge of the visible universe	4.2Gpc or 13.8 Gly

The parsec is also used for the calculation of absolute magnitude of stars, which how bright a star would be when observed from a distance of ten parsecs, a topic for a future article.

Returning to Hollywood, the biggest blooper wasn't in Star Trek. It should go to Star Wars Episode IV, "A New Hope," when Han Solo mistakes it for a unit of time; when he says that the Millennium Falcon was "the ship that made the Kessel Run in less than twelve parsecs." Clearly, more fiction than science!

AAS LIBRARY
Open for business!

THE LIBRARY IS A RESOURCE FOR MEMBERS -PLEASE SUPPORT IT AND MAKE USE OF IT

The Library list is also available on the website under "links" and can be downloaded



The library is now full up - if you would like to obtain a list or borrow an item

– contact Alex at the next meeting or give him a call on 01563 520887.

Unfortunately Alex does not have email, however messages via library@ayrastro.com will reach him the old fashioned way after a short delay but please contact him directly if at all possible.

THE LIBRARY IS WAITING FOR YOUR CALL!! There are a lot of interesting items to borrow