JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

September 2022 EDITION
Editor: ewellastro.editor@gmail.com
Email: ewellastro@gmail.com
Website: https://www.ewellastronomy.org

Editorial

Welcome to the September edition of Janus – the first since the Summer break. Our next meeting will be on 9th September when the speaker will be Professor Brad Gibson from the University of Hull Centre of Astrophysics who has yet to advise the topic of his talk. The previous week, Saturday 3rd September will be our annual picnic at Headley Heath.

August was notable for its long balmy evenings which now (sadly) seem to be behind us. As Gary noted last month, such evenings are frequently not accompanied by clear skies, so the month was clearly one to be relished by those prepared to stay up late and/or get up early to view the short duration night skies. September's nights will be longer, and hopefully still reasonably warm, providing opportunities to view those planets that are creeping back into the late evening skies.

With JWST beginning routine operations, NASA's focus of attention has turned to the Artemis -1 mission which marks the first step along the road to returning humans to the Moon. The (unmanned) mission was to have launched on 29th August; sadly, only 40 minutes before scheduled lift-off, a technical problem led to the launch being postponed until at least 2nd, possibly 5th September.

If all goes well with Artemis-1, the next stage, in 2024, is to launch Artemis-2, carrying 4 astronauts on a lunar flyby some 9000km above the Moon's surface. Finally, in 2025, Artemis-3 will land humans on the Moon, near its South Pole. Candidate landing regions have already been identified: *https://www.nasa.gov/press-release/nasa-identifies-candidate-regions-for-landing-next-americans-on-moon*

John

The Solar System September

MERCURY: begins the month just visible as an evening object, having recently passed greatest elongation E. It is, however, very difficult to see, reaching its highest point in the sky during daytime and being 2° below the horizon at dusk. Visibility throughout the month remains, at best, very difficult. It ends the month emerging into the morning sky, approaching greatest elongation W, but is not readily observable since it is very close to the Sun, at a separation of only 12° from it.

VENUS: will soon pass behind the Sun. It begins the month visible in the dawn sky, rising at 04:48 BST – 1 hour and 22 minutes before the Sun – and reaching an altitude of 8° above the E horizon before fading from view as dawn breaks around 05:49. By the end of the month, it is not readily observable since it is very close to the Sun, at a separation of only 6° from it.

MARS: is visible throughout the month as a morning object. It begins the month visible in the dawn sky, rising at 22:44 BST and reaching an altitude of 56° above the SE horizon before fading from view as dawn breaks around 05:37. By the end of the month, approaching opposition, it becomes accessible around 22:42, when it reaches an altitude of 8° above the NE horizon. It will then reach its highest point in the sky at 05:39, 60° above the S horizon before being lost to dawn twilight around 06:30, 59° above the SW horizon.

JUPITER: is currently approaching opposition and is visible as a morning object. It begins the month visible in the morning sky, becoming accessible around 21:32 BST, when it reaches an altitude of 7° above the E horizon. It will then reach its highest point in the sky at 02:46, 39° above the S horizon, before being lost to dawn twilight around 05:49, 26° above the SW horizon. At the end of the month, it will become accessible around 19:32, when it rises to an altitude of 7° above the E horizon. It will reach its

highest point in the sky at 00:39, 38° above the S horizon, and become inaccessible around 05:46 when it sinks below 7° above the W horizon.

SATURN: begins the month approaching opposition and is visible as a morning object. It will become accessible around 20:35 BST, when it rises to an altitude of 10° above the SE horizon. It will reach its highest point in the sky at 23:49, 22° above the S horizon, and will become inaccessible around 03:03 when it sinks below 10° above the SW horizon. By the end of the month, it is an early evening object. Visible in the evening sky, it becomes accessible around 19:18 BST, 14° above the SE horizon, as dusk fades to darkness. It will then reach its highest point in the sky at 21:48, 22° above the S horizon, and will continue to be observable until around 00:58, when it sinks below 10° above the SW horizon.

URANUS: is currently emerging from behind the Sun and, throughout the month, is visible in the dawn sky. It begins the month rising at 21:50 BST and reaching an altitude of 54° above the S horizon before fading from view as dawn breaks around 04:45. It ends the month still visible as a morning object, becoming accessible around 22:21, when it reaches an altitude of 21° above the E horizon. It will then reach its highest point in the sky at 03:28, 55° above the S horizon, before being lost to dawn twilight around 05:38, 46° above the SW horizon.

NEPTUNE: is currently approaching opposition and is visible as a morning object. At the beginning of the month, it is visible in the morning sky, becoming accessible around 22:50 BST, when it reaches an altitude of 21° above the SE horizon. It will then reach its highest point in the sky at 02:00, 35° above the S horizon before being lost to dawn twilight around 04:45, 24° above the SW horizon. At the end of the month, it will become accessible around 20:56, when it rises to an altitude of 21° above the SE horizon. Reaching its highest point in the sky at 00:03, 34° above the S horizon, it will become inaccessible around 03:11 when it sinks below 21° above the SW horizon.

MOON PHASES:

New Moon	27 Aug
First Quarter	3 Sep
Full Moon	10 Sep
Last Quarter	17 Sep
New Moon	25 Sep

Notable Events:

Observation of some of these events may require a telescope, although some will be visible with the naked eye. More information with times at *https://in-the-sky.org*

September

1 Aurigid meteor shower 2022
7 Asteroid 3 Juno at opposition
8 Close approach of the Moon and Saturn
9 September ε-Perseid meteor shower 2022
11 Close approach of the Moon and Jupiter
14 Close approach of the Moon and Uranus
16 Neptune at opposition
17 Close approach of the Moon and Mars
23 September equinox
26 Jupiter at opposition
27 Daytime Sextantid meteor shower 2022

Collected Observations (and thoughts) – Gary Walker

Latest Observations in August – 20 August

Due to the continuing clear and warm nights, I have frequently been sitting out in my garden and am often observing objects. The planets Saturn, Jupiter and Mars are now starting to creep into the late evening skies.

Mars was still small, at just under 9' arcseconds in size, and I thought I could just about pick out a dark feature upon it, but not clearly. Despite that, Mars was now over twice the size it was when furthest away, when it was only 4' arcseconds in size.

I even saw Venus clearly, low in the NE, at about 4.29 am, but this planet has been "badly placed" for a long time now, and is set to get even worse, as it rises nearer and nearer to Sun rise time.

The "Summer Triangle" formed by the bright stars of Vega, in Lyra, overhead, with Deneb in Cygnus, and Altair in Aquila, was first named as such by the great Sir Patrick Moore. When looking at Cygnus through my binoculars, I noticed for the first time a rough

circle of stars encircling the star Sadr, a star which is easy to identify as it sits at the heart of the large summer asterism (a sort of mini constellation) known as the Northern Cross, the core portion of Cygnus.

Around the nights of Mid - August, I saw some meteors moving North to South, which were obviously Perseids. Ironically, the peak of this meteor shower was spoilt by the August "Super Moon"; Super Moons are still of interest to the media even though, astronomically, there is no such thing!

The Sun continued to be busy in both white, and Ha light. An enormous Prominence was visible between 2nd and 4th August, before disintegrating. Naturally, this was a major subject of interest on the Space Weather News website, appearing in its photo gallery.

I still managed to see Comet PANSTARRS in August, but it eventually got to the point that it became too diffuse and faint to be seen, as well as sinking gradually low down in the South.

More Observations – 28 August

On the night of 27th–28th August, I was sitting out in my garden again, on a clear night. Now, there were a total of 3 planets visible in the late evening sky, at an acceptable time (earlier in the year, they were stuck in the morning sky, just before dawn). These, in order, were Saturn, Jupiter and Mars.

I could see the Pleiades star cluster in the East, and it has been said that when you can see it, it means that Autumn is on its way.

I was observing M31 with my 11 X 80 binoculars, but I could also just pick it out with the naked eye.

I could see the star, Fomalhaut, very low down in the SE sky. This only gets up to about 8 - 9.5 degrees above the horizon, so it gives a good idea of how low down, and how far to the South, I can see from my garden! Despite its low altitude, it is easily visible to the naked eye. It is part of the Piscis Austrinus, the “Southern Fish” constellation. Fomalhaut is magnitude 1.16, so, it is one of the brightest stars, but tends to get overlooked at our latitudes due to its low altitude. The easiest way to find it is by dropping in a straight line from the star, forming the bottom right-hand corner of the Square of Pegasus, Markab (or by using both this star and Scheat, which forms the upper right-hand corner of the Square of Pegasus, and using the two stars as "pointers").

More on the Night Sky – 28 August

The galaxy, M31 is stated to be the most distant celestial object that can be seen with the naked eye, at 2.5 million light years. However, some amateur astronomers, observing from very dark skies, have managed to see more distant galaxies with the naked eye. These include M33, at about 2.7 million light years, and even M81, at 12 million light years!

The standard faintest object seen with the naked eye, in a dark sky, has always been stated as magnitude 6, but now some amateur astronomers observing under REALLY dark skies, have got down to magnitude 8!

As the planet Neptune is just short of magnitude 8, I wonder if anyone of them have managed to see it without optical aid. So far, I have not heard of it, and usually, of course, optical aid is essential to see it at all! The planet Uranus was missed, despite being within naked eye reach, just short of magnitude 6. It took Sir William Herschel, with a telescope, to discover it. Even then, for some time, he didn't realise that he had found a new planet - instead, he thought that it was a new comet. Perhaps such a mistake was not unreasonable, considering that no new planets had been found since Classical Times. Of course, they were all easily visible with the naked eye! Indeed, such a great astronomer as Galileo just missed discovering Neptune, even though he had marked it as a star. Even more frustratingly for him, he HAD noticed that, over a period of time, it had moved. For some reason though, he failed to make the mental leap to the next step. Even the great John Herschel, son of Sir William Herschel, saw it in 1795, but made the same mistake! It was probably missed due to its slow movement, as well as its tiny angular size.

Artemis 1 – Top Story in the BBC News on 29 August

I was amazed to see that the launch of Artemis-1 was the Top Item on the 1pm BBC News. It is so rare that astronomical or space missions get to be the "Top Story" on the News, as usually it is the last item on the main news, as the "and finally" piece!

The last time this happened was the Total Solar eclipse of 11th August 1999 plus, of course, the Apollo 11 Moon landing and the Apollo 13 emergency!

The Artemis-1 mission to the Moon (unmanned) was supposed to launch in the afternoon of 29th August. Sadly, 40 minutes before launch, there was the dreaded "scrub" to it, due to some ongoing technical problems. However, it was expected to be launched on 2nd September or thereabouts.

By the time of the 6pm News, on BBC 1, it had been relegated to the 3rd item. This is the first major mission back to the Moon after 50 years, and is expected to, once again, land astronauts on the Moon. Of course, some unmanned probes have gone around the Moon, and some, like a Chinese probe, landed on the far side of the Moon last year.

More afoot on the Sun! – 29 August

During August, there were one or two more giant Prominences on the Sun, such as one on the bottom limb, which appeared like a tree or a giant brush, as it started off from the limb as a long spear, extending out into "branches" at the end of it. This was visible for at least 5 days! Often, there were numerous plages and filaments upon the disk.

In white light, there were sunspots visible every day, often with several groups on the disk at the same time, which is not surprising as we are approaching the Solar Maximum!

Object of the month – Saturn – Martin Howe

Like our object of the month last month (the Sun) this month's object also needs no introduction – it is the majestic planet Saturn. It is the outermost of all the 5 planets known in ancient times, and was first observed telescopically by Galileo in 1610:

> *Because of the crudeness of his telescope, he couldn't determine what the rings were. He incorrectly guessed that there were two large moons on either side of Saturn. Two years later when he viewed Saturn again, the "moons" had disappeared. We know now this is because Galileo was viewing the rings edge-on so that they were invisible, but at the time it was very confusing to Galileo. After another two years, Galileo viewed Saturn again and found that the "moons" had returned. He concluded that the rings were "arms" of some sort.*
> [Extract from https://attic.gsfc.nasa.gov/huygensgcms/Shistory.htm]

Galileo's initial representation of Saturn

Saturn comes around to opposition a little over 12 months after the previous opposition (as by the time the Earth has completed one orbit, Saturn has not made a lot of progress in its own 29-year orbit). Opposition this year was on August 14th (compared to August 2nd last year).

Saturn should be relatively easy to find, albeit fairly low in the southern sky - it only reaches about 23 degrees in altitude as it crosses the meridian. However, it will be shining at quite a respectable magnitude (+0.4) and sitting in the relatively faint constellation of Capricorn.

Note that Jupiter is further east and significantly brighter at about magnitude –2.9 making it the brightest object in that region of sky, so it should be easy not to mistake the two (refer to a planetarium app or software such as Stellarium for further assistance in locating Saturn if required).

Saturn's rings should be visible with a good pair of binoculars. The image below was actually taken at last year's apparition when Saturn was even lower in the sky – at about 20 degrees altitude - so the view this year should be slightly better. However, the rings are now closing and so we will see them at a narrower angle of about 14 degrees, and by 2025, they will be seen edge on (but at least by then Saturn will have climbed to an altitude of closer to 35 degrees as it transits the meridian).

So how was this photo taken?

As the photo caption notes, it was captured through a 127mm refractor coupled with a 2x Barlow lens (effectively magnifying the original image by a factor of two). The camera was a ZWO CMOS camera used in video capture mode using the Firecapture freeware. The video captured 800 frames, and the best 50% of these frames were then stacked together using another excellent freeware package, AutoStakkert. Finishing touches were then made using Photoshop.

Mystery crater potentially caused by relative of dinosaur-killing asteroid

Acknowledgement: This article was written by Uisdean Nicholson, Associate Professor of Geoscience, Heriot-Watt University; Sean Gulick, Research Professor of Geoscience, University of Texas at Austin; Veronica Bray, Research Scientist, Lunar & Planetary Laboratory, University of Arizona. It was published in THE CONVERSATION on 17th August 2022. It is republished in full under Creative Commons Licence. The original article, with additional links can be found here: *https://theconversation.com/mystery-crater-potentially-caused-by-relative-of-dinosaur-killing-asteroid-188759*

The ocean floor is famously less explored than the surface of Mars. And when our team of scientists recently mapped the seabed, and ancient sediments beneath, we discovered what looks like an asteroid impact crater.

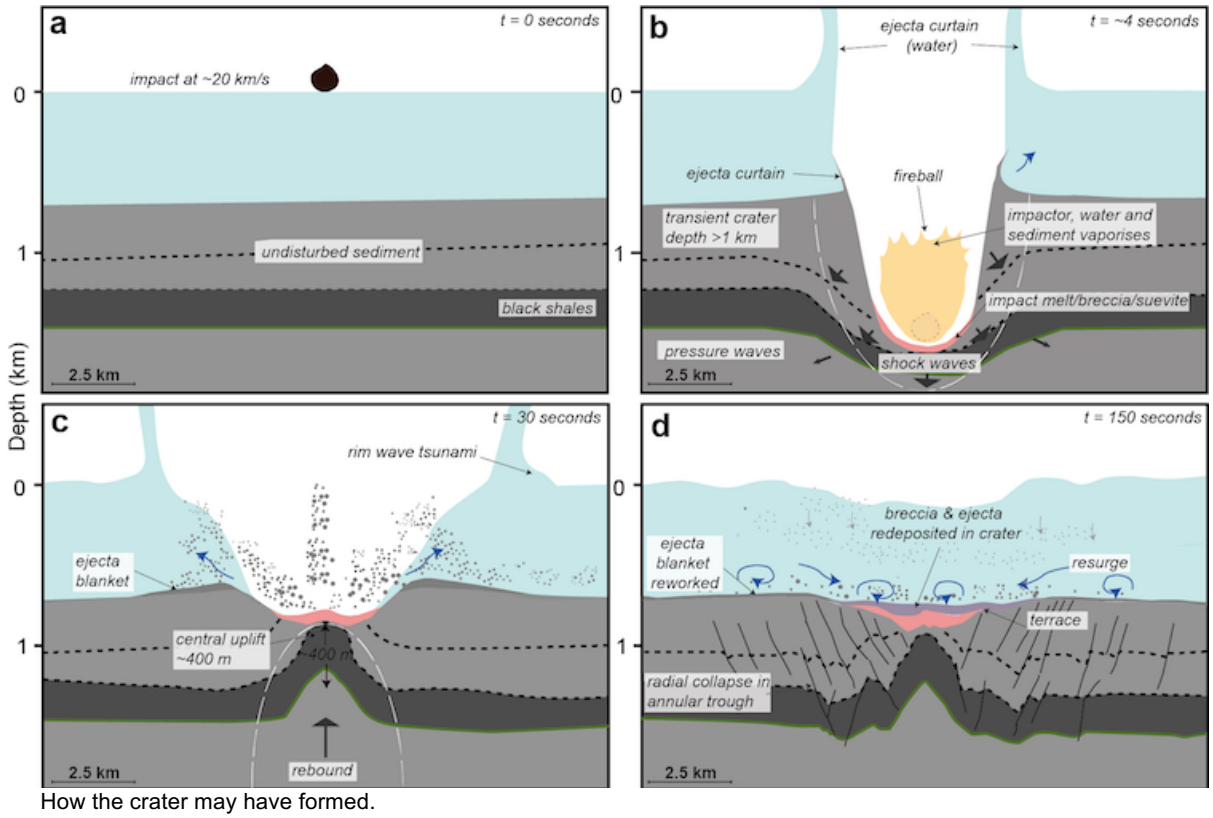
Intriguingly, the crater, named “Nadir” after the nearby volcano Nadir Seamount, is of the same age as the Chicxulub impact caused by a huge asteroid at the end of the Cretaceous period, around 66 million years ago, which wiped out the dinosaurs and many other species.

The finding, published in Science Advances, raises the question of whether the crater might be related to Chicxulub in some way. If confirmed, it would also be of huge general scientific interest as it would be one of a very small number of known marine asteroid impacts and so give unique new insights into what happens during such a collision.

The crater was identified using “seismic reflection” as part of a wider project to reconstruct the tectonic separation of South America from Africa back in the Cretaceous period. Seismic reflection works in a similar manner to ultrasound data, sending pressure waves through the ocean and its floor and detecting the energy that is reflected back. This data allows geophysicists and geologists to reconstruct the architecture of the rocks and sediments.

Scrolling through this data at the end of 2020, we came across a highly unusual feature. Among the flat, layered sediments of the Guinea Plateau, west of Africa, was what appeared to be a large crater, a little under 10km wide and several hundred metres deep, buried below several hundred metres of sediment.

Many of its features are consistent with an impact origin, including the scale of the crater, the ratio of height to width and the height of the crater rim. The presence of chaotic deposits outside of the crater floor also look like “ejecta” – material expelled from the crater immediately following a collision.



How the crater may have formed.

We did consider other possible processes that could have formed such a crater, such as the collapse of a submarine volcano or a pillar (or diapir) of salt below the seabed. An explosive release of gas from below the surface could also be a cause. But none of these possibilities are consistent with the local geology or the geometry of the crater.

Earthquakes, air-blast, fireball and tsunamis

After identifying and characterising the crater, we built computer models of an impact event to see if we could replicate the crater and characterise the asteroid and its impact.

The simulation that best fits the crater shape is for an asteroid 400 metres in diameter hitting an ocean that was 800 metres deep. The consequences of an impact in the ocean at such water depths are dramatic. It would result in an 800-metre-thick water column, as well as the asteroid and a substantial volume of sediment being instantly vapourised – with a large fireball visible hundreds of kilometres away.

Shock waves from the impact would be equivalent to a magnitude 6.5 or 7 earthquake, which would likely trigger underwater landslides around the region. A train of tsunami waves would form.

The air blast from the explosion would be larger than anything heard on Earth in recorded history. The energy released would be approximately a thousand times larger than that from the recent Tonga eruption. It is also possible that the pressure waves in the atmosphere would further amplify the tsunami waves far away from the crater.

Chicxulub relative?

One of the most intriguing aspects of this crater is that it is the same age as the giant Chicxulub event, give or take one million years, at the boundary between the Cretaceous and Paleogene periods 66 million years ago. Again, if this really is an impact crater, might there be some relationship between them?

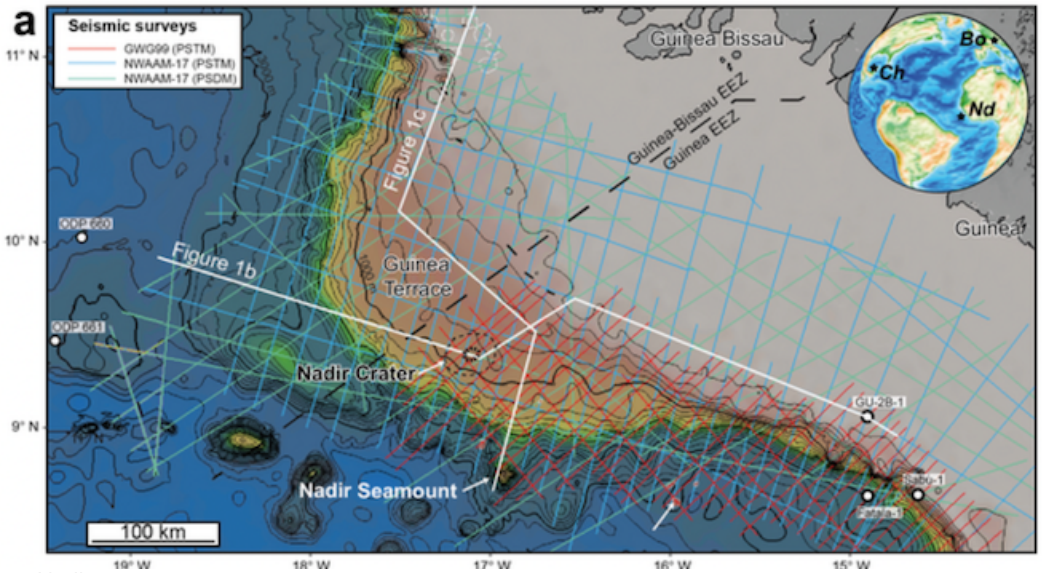
We have three ideas as to their possible relationship. The first is that they might have formed from the break-up of a parent asteroid, with the larger fragment resulting in the Chicxulub event and a smaller fragment (the “little sister”) forming the Nadir crater. If so, the damaging effects of the Chicxulub impact could have been added to by the Nadir impact, exacerbating the severity of the mass extinction event.

The break-up event could have formed by an earlier near-collision when the asteroid or comet passed close enough to Earth to experience gravitational forces strong enough to pull it apart. The actual collision could then have occurred on a subsequent orbit.

Although, this is less likely for a rocky asteroid, this pull-apart is exactly what happened to the Shoemaker-Levy 9 comet that collided with Jupiter back in 1994, where multiple comet fragments collided with the planet over the course of several days.

Another possibility is that Nadir was part of a longer lived “impact cluster”, formed by a collision in the asteroid belt earlier in solar system history. This is known as the “little cousin” hypothesis.

This collision may have sent a shower of asteroids into the inner solar system, which may have collided with the Earth and other inner planets over a more extended period of time, perhaps a million years or more. We have a precedent for such an event back in the Ordovician period – over 400 million years ago – when there were numerous impact events in a short period of time.



Nadir crater.

Finally, of course, this may just be a coincidence. We do expect a collision of a Nadir-sized asteroid every 700,000 years or so. For now, however, we cannot definitively state that the Nadir crater was formed by an asteroid impact until we physically recover samples from the crater floor and identify minerals that can only be formed by extreme shock pressures. To that end, we have recently submitted a proposal to drill the crater through the International Ocean Discovery Program.

As with the main impact crater hypothesis, we can only test the little sister and little cousin hypotheses by accurately dating the crater using these samples, as well as by looking for other candidate craters of a similar age.

Perhaps more importantly, could such an event happen in the near future? It is unlikely, but the size of the asteroid that we model is very similar to the Bennu asteroid currently in near-Earth orbit. This asteroid is considered to be one of the two most hazardous objects in the solar system, with a one-in-1,750 chance of collision with Earth in the next couple of centuries.

Up Next:

ANNUAL PICNIC: Saturday 3 September 2022

Our annual picnic and observing session will be held from 6:30pm – 11:00pm on Saturday 3rd September at Headley Heath

NEXT MEETING: 8pm Friday 9 September - Nonsuch High School

Professor Brad Gibson from the University of Hull Centre for Astrophysics will give a presentation on a subject to be advised.

Ron Canham will also give his usual Sky at Night presentation for the month to come.

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

The next session, allowing for moon rise & set times and cloud conditions, may be sometime around the new moon on 25th September. The precise date and timings of any session will be advised by email and WhatsApp a few days in advance

AD HOC OBSERVING AT WARREN FARM:

These will be at short notice when the weather is favourable. Please watch our WhatsApp feed for alerts.