

Federation of Astronomical Societies



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Newsletter

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Note: The FAS Council Reserves the Right to publish articles, events and reports submitted to the FAS Newsletter

President's Spot: Dr Paul A. Daniels FRAS



Apologies once more that the President's Spot is short again but, in my defence m'lud, I have also written an article for this edition of the Newsletter. Otherwise, it's been a quiet few months since I last rambled on (and on and...) in these pages.

As you'll see from my article later, I attended the SATCON2 conference and I'm ready to feed the information gained from that into the FAS/BAA/SPA/RAS collaboration organising amateurs to make satellite observations – more on that in the next Newsletter.

As the 2020 AGM was very successful as a Zoom meeting with very good attendance and more effective discussions, we've decided to continue using Zoom for AGM meetings for the foreseeable. It has the advantage that we reach more people from more areas of the country and more easily and we also don't have to wedge it in between morning and afternoon lecture sessions of a Convention. With all the work that goes into arranging conventions we'd like to open them to the public and it would be awkward asking them *not* to attend the post-lunch AGM and having to arrange something else for them to do instead.

Jerry Stone, our meetings organiser, is busy organising our next

Convention. We seem to be clear of the worst of the pandemic in the UK with widespread vaccination so we've decided to return to an in-person Convention but a little later in the year than usual.

We are very pleased to tell you that the venue will be the National Space Centre in Leicester. Please see the Convention announcement on page 4 for full details.

So, with those arrangements in mind, I can informally let you know the following dates for your diaries:

2021 FAS AGM

On Saturday, 16th October 2021 and

2021 FAS Convention

On Saturday, 13th November 2021

Stay safe and clear skies

Paul
August 2021

FAS on YouTube

The FAS has hosted two online conferences so far this year, and these are now available on YouTube. They are "The COVID Outreach Webinar held on Saturday 9th January 2021, and the FAS Convention held on Saturday 17th April 2021. These events are now available as video recordings on our YouTube channel. Our channel is located at <https://www.youtube.com/channel/UCnmaTudqwjs9k7Gr-WhUzw> but it is easier just to search for "Federation of Astronomical Societies YouTube".

The screenshot shows two video thumbnails from the FAS YouTube channel. The left thumbnail is for the 'FAS Convention 17 Apr 2021' video, which has 191 views and was posted 3 months ago. The right thumbnail is for the 'FAS Covid Outreach Webinar' video, which has 395 views and was posted 7 months ago. Both thumbnails feature a blue background with the Earth visible and the FAS logo.

Video Title	Views	Posted
FAS Convention 17 Apr 2021	191	3 months ago
FAS Covid Outreach Webinar	395	7 months ago

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Historic FAS Newsletters Come to Light

By Michael Bryce



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issue number 1.

June 1984

A NIGHT AT THE TEMPLE OBSERVATORY
By Rob Moseley
(Coventry and Warwickshire A.S.)

It is one of those British rarities - a starlit night that's going to stay clear. A couple of phone calls and its all fixed. Tonight I shall be observing with one of the finest refractors ever made.

slit of eastern sky. We both stand and look for a moment. Above the Moon the Twins, Castor and Pollux sparkle. After handing me a set of modern orthoscopic eyepieces my companion leaves telling me he will look in again after two hours.

I uncap the telescope and peer at Mr Clark's handiwork. The lens shines softly in the reflected moonlight. But

Archimedes to Maginus, and Maginus to the tremendous Clavius. All these vast enclosures are in high relief, about to be swallowed by the long lunar night.

But my night is almost over. It is 2.30 - and as the Moon rises further the eye-end of the telescope falls, and I have gradually got into one of those "in-between" positions - which are a real pain in the neck! It's a good time to break off. Out

The FAS Newsletters have been a stalwart FAS publication since issue number one published in June 1984, see above, some 37 years ago. These publications have included Member Society information and other useful information. And back issues have been available in the FAS website. Whilst this long time continuation is a great achievement for the FAS, we have now been informed that the Newsletter goes back even further.

Eric Hutton, a former Council Member of the FAS, was clearing out some cupboards and has found FAS Newsletters from two years earlier!

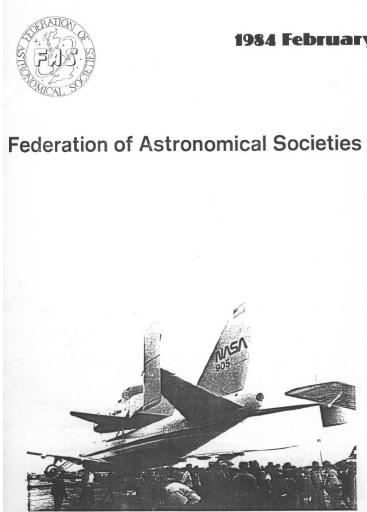
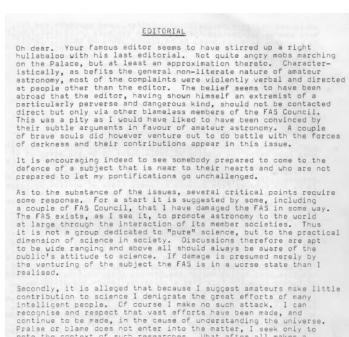
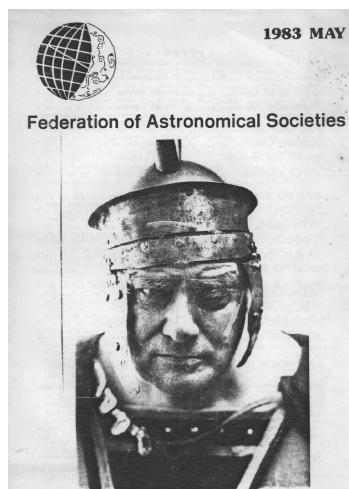
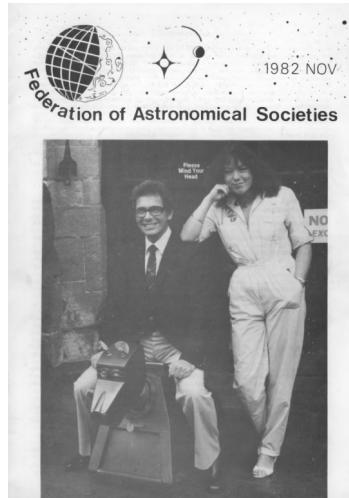
The November 1982 edition cover is depicted top right, where you see Professor Alec Boksenberg, sitting on Dr Who's K9 robot, with Heather Couper.

The May 1983 issue is seen on the right depicting Sir Patrick Moore in an historic military costume.

All of these issues of course were produced before the days of the modern home computer. With long paragraphs of type-written text such as the example shown on the lower right. With very few images in the early editions. And issues longer than twenty pages too.

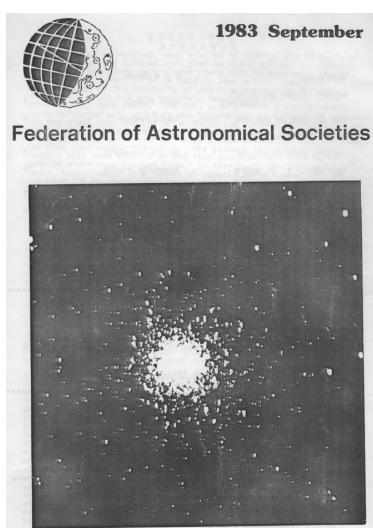
We have four of these editions kindly scanned into digitised form by Eric. These are November 1982, May 1983, September 1983 and February 1984. These will be made available on the EAS website.

Michael Bryce

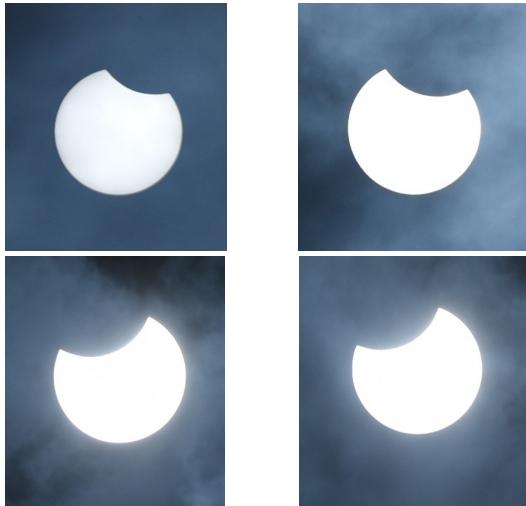


1984 February

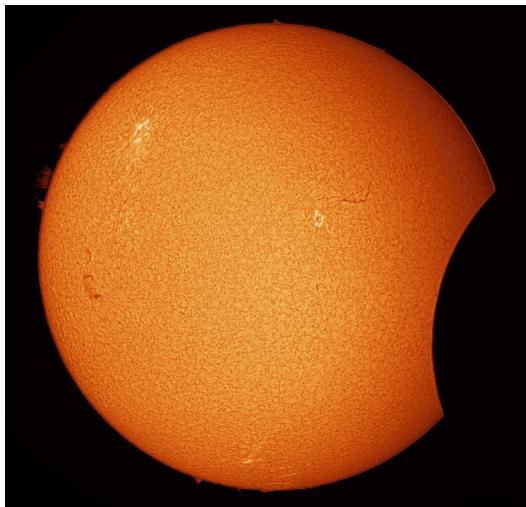
Federation of Astronomical Societies



Partial Solar Eclipse: 10 June 2021



David Lowndes is a Professional Photographer and member of the Peterborough AS. David took these images with his Nikon D750 with a 200mm lens using a 10 stop neutral density filter.



Phil Shepherd, also from Peterborough Astronomical Society (and past Chair), sent this image and the following caption.

I was lucky enough to be able to take about 20 seconds of a recording with my ZWO 1174MM camera through a double-stacked Lunt 60mm Solar scope, despite all the clouds here in Deeping St. James, which is just north of Peterborough. It was towards the end but at least I got something. The activity on the Sun also seems to be picking back up again.

The best 15% of the frames were stacked with Autostakkert, sharpened & false colour added in PixInsight.

Phil Shepherd



For most of the eclipse on 10th June 2021 I had total cloud cover. But at around midday a little sunlight came through and I managed to photographed the eclipse at 12:05 BST. Taken from home in Stourbridge, West Midlands. Nikon Z7 with old Tamron 500 mm mirror. Manual focus. Fixed F8. 1/250th Sec. Tripod. Baader solar filter.

Michael Bryce
FAS Newsletter Editor



The Federation of Astronomical Societies

Autumn 2021 Convention

The FAS is delighted to announce that we will be holding an **in-person convention** on **Saturday 13 November** at the **National Space Centre** in Leicester.

Doors will open at 9:15am and the event will run from 10:15am to 4pm, giving visitors some time afterwards to view the NSC galleries (at no extra charge) and the NSC shop. For those able to arrive by 9:30am there will be an exclusive and free **planetarium show**.

We are planning a major line-up of speakers. Already confirmed are:

Matt Nicholl from the University of Birmingham - "***Gravitational Waves***"

Julian Onions from the University of Nottingham - "***Dark Matter: Is It Dark and Is It Matter?***"

Watch the FAS website for details of other speakers as they become available.

We expect a maximum of just **150 places** available, and **tickets must be booked in advance through the FAS website**. *Tickets will go on sale shortly*. The tickets are just **£10** for adults. **Under-16s (£5)** must be accompanied by an adult. Family tickets are **£20** (Please enquire regarding details of family tickets). These prices are for members of FAS affiliated organisations. Public tickets are also available at £15 / £7.50 / £30.

There will also be a **raffle**, and we will be running a fun **quiz** during the lunch break. The ticket price **includes a snack lunch**, though you can of course bring your own. The aim is to avoid overloading the NSC cafe.

We are arranging for displays from professional organisations, and there are also a few spaces for societies to have a display to promote their activities. **The society spaces are free**, and available on a first-come-first-served basis.

If travelling by car - perhaps you can arrange to car-share - the ticket also includes **free parking** (normally £3). If you are going by train, a bus from Leicester station will cost approx £5 and the stop is just a 7-minute walk from the NSC. A taxi door-to-door will cost about £10.

This will probably be the first national astronomy event since 2019, so we hope you will take the opportunity to hear some great speakers and meet with other astronomy enthusiasts at a terrific location. The event will *not* be live-streamed, so if you are interested, then you need to be there!

For further details, see the FAS website at www.fedastro.org.uk

If you have any questions, or wish to reserve a display space for your society, please contact the **FAS Meetings Organiser, Jerry Stone**, at meetings@fedastro.org.uk

Contact Jerry for information about opportunities for sponsorship, exhibiting, and advertising in the convention programme and on the website.

Please note: If COVID restrictions or other circumstances outside of our control mean that we are unable to hold the event, a full refund will be made for tickets purchased. Unfortunately we cannot refund travel or accommodation costs.

Private Sites with Dark Skies

A number of land owners in the UK have indicated they would welcome approaches by astronomical societies to use their land for astronomical purposes

You will find below a short initial list of sites in the country whose owners have indicated that they are open to approaches from FAS Member Societies in regard to accessing a dark skies site for astronomical purposes. If you know of further sites that could be included on this list, please contact Neil Mudford at publications@fedastro.org.uk. Telephone 01623 759954.

To book a site please contact the site directly on the phone number provided as the Federation is not a booking agency for this nor will we intervene in the commercial negotiations between you and the land occupier. When booking check what is being provided and then make your arrangements accordingly.

As regards facilities, each site will offer a weather resistant surface, vehicle access to within a quarter of a mile though some will have mains, weather shelter and in a couple of cases on-site toilet facilities.

Planning regs do allow the occasional caravan/motor home to be parked convenient for observers though one or two are

commercial caravan sites with a rally field. The booker should confirm that bringing them and other temporary structures like gazebos will be OK.

If your society has taken out public liability (from any provider) you will be insured against PLI claims only if the site is booked in its name, otherwise the booker must arrange to provide proof of insurance cover themselves if requested.

Please be mindful of other users of the site if present.

Scotland, Borders

TD1 2PN, 04478 66553248, JGThomson@hotmail.co.uk
Mr. John Thompson, Chapel Mains Farm, Blainslie, Galashiels, Selkirkshire (Same owner as T10 6UP)

Scotland, Borders

TD10 6UP, 04478 66553248, JGThomson@hotmail.co.uk
Mr. John Thompson, Caldside Farm Cottages, Greenlaw, Duns.
(Same owner as TD1 2PN)

England, Alnwick

NE67 5HX, 0797 6900668, middlemoorfarm@btconnect.com
Mrs. Jane Armstrong, Middlemoor Farm, North Charlton, Alnwick. www.middlemoorfarmholidays.co.uk
** Mrs Armstrong is looking for a society in her area to advise on developing this income stream.

England, Oxfordshire

OX7 5RH, 01608 737536 (Answerphone)
Mrs Marilyn Chapman, Manor Farm, Great Rollright, Oxfordshire

England, Winchester

SO21 3NZ, 07407 240519, oatkinson@bcm.co.uk
Mr Oliver Atkinson, BCM, The Old Dairy, Sutton Scotney, Winchester

England, Wisbech

PE14 8QN, 07768 088085
Mr. Giles Shakespeare, Bridge Farm, Stow Road, Outwell, Wisbech, Cambridgeshire

Wales, Brecon

LD3 8RD, 01554 773779, 01874 638220
Mr. Stuart Poulson, Bronydd-Mawr Farm, Llwell, Brecon, Powys, Wales

Wales, Cardigan

SA431PR, 01239 612196, info@cardiganisland.com
Mr. Lyn Jenkinson, Cardigan Island Coastal Farm Park, Gwbert, Cardigan, Ceredigion, Wales

Megaconstellations – Still A Threat!

Dr Paul A Daniels, FRAS

You may recall the article, *The Megaconstellation Threat*, I wrote for issue #118 (v2) of the June 2020 FAS Newsletter. I've also had the pleasure (mine and, hopefully, yours) of giving a talk on that subject to eleven FAS member societies so far. The article has a reading time of three glasses of wine (tip: rather more glasses if you read *all* the stuff in the tables and very carefully check all the references ☺) and the talks need a break near the middle as there's *quite a lot* to say about the problem of satellite megaconstellations! This article is to bring you up to date on the work that's being done but limitations of space-time (space in the newsletter and my time) means I'm not able to cover everything.

SATCON1

The American Astronomical Society (AAS) in collaboration with the US National Science Foundation's NOIRLab arranged the online SATCON1 conference between 29th June and 2nd July 2020 to produce recommendations the satellite operators could adopt to be reasonable and diligent in their efforts to mitigate the impact on both astronomy and the health of near-Earth space, the upper atmosphere and the terrestrial environment. SATCON1 also created an action-plan for astronomers to define areas of discussion and research to reduce the impact on their observations and the useful science they generate. The full SATCON1 reports are available at <https://aas.org/satellite-constellations-1-workshop-report> and the YouTube video of the press briefing is at <https://www.youtube.com/watch?v=VCyE8BNYIKM>.

In summary, there were two groups of findings from that conference:

Findings 1 - Observations

(a) The greatest density of bright satellites in the sky will be near the twilight dusk or dawn horizon.

Greatest impact on, for example, searches for near-Earth objects (e.g. asteroid threats) and the optical counterparts to brief gravitational wave detections. Poor constellation design (satellite hardware and orbits used) could severely affect observations. Less affected observatories will still require new software and hardware solutions to mitigate the effects.

(b) There are three levels of visibility that categorise the impact:

(i) Visible to the naked eye

More impact on the public, the casual amateur observers and, possibly, affecting some indigenous people's relationship with the sky and certain religions that use the sky for calendar calculations.

(ii) Not naked-eye visible but bright enough to affect the calibration of sensors

Can affect the calibration of sensors by introducing artefacts. This makes subsequent observations invalid until successfully re-calibrated.

(iii) Bright enough to produce an unsaturated trail

Trails may be partially removed by software with varying degrees of success.

Findings 2 - Mitigations

- (a) Launching fewer or no LEO satellites reduces the impact (possibly to zero).
- (b) Deploying satellites no higher than 600km altitude significantly reduces the time illuminated by sunlight and mitigates the impact.
- (c) Darkening satellites or adding shades might help.
- (d) Changing the satellite's attitude to reduce downward reflections might help.
- (e) It may be possible to use software to remove the satellite trails from images.
- (f) It may be possible to obtain ephemerides, projections of the satellites' positions, accurately enough that observations can avoid the satellites altogether.

SATCON1 principally concentrated on the effects on optical astronomy and none of the (b)-(e) mitigations above are helpful to radio astronomy.

As a result of the findings, there were ten recommendations made by SATCON1:

- Rec 1) Develop software to identify, model, subtract and mask satellite trails.
- Rec 2) Develop software to help observation planning (e.g. avoidance of the satellites)
- Rec 3) Make detailed simulations of the effects of masked trails on research results and identify lower limits of brightness and trail density below which the effects are significantly reduced.
- Rec 4) LEO satellite operators should perform laboratory measurements of the Bi-directional Reflectance Distribution Function (BRDF). This is a 'map' of the direction in which light incident on the satellite, coming from different directions, is reflected and with what brightness changes due to satellite albedo/shading. This would be particularly useful in modelling of the satellites' observed brightness.
- Rec 5) Reflected sunlight should be slowly varying during a satellite's orbit and, for wide-field camera telescopes, e.g. the Vera Rubin Telescope (VLT), they should be fainter than 7th magnitude.
- Rec 6) Satellite operators should endeavour to avoid specular reflections.
- Rec 7) Try to clump satellites close together immediately post-launch and orient them to reduce reflections to the ground.
- Rec 8) Organise a coordinated effort to observe LEO satellites to measure reflectivity variations and assess the effectiveness of mitigations including during ascent to service altitude and descent towards re-entry. This should be an effort involving global distribution of observers to obtain different Sun-Satellite-Observer geometries. Work towards developing observing methods that improve consistency.
- Rec 9) Determine the required improvement in quality of positional information or processed telemetry, distribution and predictive modelling to achieve a 10-times improvement in publicly available cross-track positional determination.
- Rec 10) To improve on the traditional Two-Line Elements (TLE) format for orbital details, adopt a new standardised format for publicly available ephemerides such that the covariances (error) and other information can be included.

SATCON2

SATCON2 was held online between 12th and 16th July 2021 and I attended all of the conference days as a representative of the FAS. The main purpose of the conference was to assess progress on the work done by people since SATCON1, get updates on any significant changes (e.g. OneWeb's resurrection) and determine any new directions the mitigation work needed to take. The conference days were divided as follows:

- Day 1** – Welcome and Reports from (1) the Observing and (2) the Algorithms Working Groups

- Day 2** – Reports from (3) the Policy Working Group

- Day 3** – Reports from (4) the Community Engagement Working Group

- Day 4** – Summary Discussions

- Day 5** – Press Briefing (available on YouTube at <https://www.youtube.com/watch?v=7DF99GIIR04>)

Days 1-3 started at 5:30pm (all times in BST) and lasted until 10:30pm with Day 4 finishing 30mins earlier and the press briefing on Day 5 being from 9pm to 10pm. The reports consisted of brief presentations by key people from each working group and, in between the sessions above, there were Q&As involving many of the attendees.

In the welcome and observing session we were reminded and updated on the scope of the problem and told about the projects proposed:

- We heard that the project to involve both professional and amateur astronomers around the world in observing satellites was getting started.
- We were warned that the VRT, which hasn't even seen first-light yet, is likely to have nearly 30% of its images with at least one satellite trail.
- We were told that the HST is already losing ~2.5% of its 10 minute exposures and that, when the number of satellites in LEO rises to 60,000, it's estimated that 20% of images will contain at least one out-of-focus trail.
- We were reminded that radio astronomy is looking for very weak astronomical signals (down to $\sim 10^{-29}$ Wm⁻²Hz⁻¹) but the signal from satellites is many orders of magnitude stronger than that.

Dr Moriba Jah (Oden Institute, University of Texas) provided a link to the interesting (and still developing) ARCADE (Advanced Research Collaboration and Application Development Environment) collaboration project between the ASTRIA Research Group (University of Texas, Austin), the IBM Space Tech team and others. The website is at <https://ibm.github.io/arcade> and has demos of several promising visualisation tools. There's also an interesting 'Conjunction Streaming Service' at <http://astriacs.tacc.utexas.edu/ui/min.html> showing in real-time which satellites are likely to have close approaches, how close they'll approach, their relative velocities and their altitudes.

There are two very encouraging early-stage projects that may be of particular interest to observers. Both were reported by Dr Harry Krantz (Steward Observatory, University of Arizona) who can be contacted at harryk@email.arizona.edu.

SatHub (provisional name)

This will become a 'one-stop' shop service to both the astronomical and satellite-operating communities:

- Observers can submit their damaged images to a database

where they'll be available for researchers to use in simulation and modelling software that's being developed. This will not only provide data to test and improve the software tools being developed but also provide feedback to the satellite operators on the effectiveness (or not!) of their own mitigation measures.

- A repository of observing guidance will accumulate so that it can become a first port of call for those involved or wanting to get involved.
- The observing project will be ongoing as satellites suffer space weathering due to impacts from space debris micro-particles, micrometeoroids and 'baking' in the full glare of the Sun's UV light and their brightness and colour may change.
- SatHub will provide a way to connect and coordinate observers and observations from around the world. It will also educate astronomers by providing feedback. How bright are they, when are they visible, will my project be affected and to what extent and what can I do to avoid them?

Trailblazer

This is a forerunner of SatHub and may eventually be merged into it (or *vice versa*). It's already in progress and already has a public repository of images affected by satellite trails. These images are in the form of FITS files and both professional and amateur astronomers are welcome to submit images in that format where they can be useful. It's still a work-in-progress and doesn't address all needs which is why it's likely that a merger could take place with SatHub.

Dr Jeremy Tregloan-Reed (University of Antofagasta) gave an insight to the satellite details we need to observe. Much of the previous emphasis has understandably been on the satellites' brightness but, if we're to be able to accurately predict *exactly* where the satellites will be at any given time, we also need to perform accurate position and timing measurements.

Currently the standard Two-Line-Elements (TLEs) describing satellite orbits are in wide use. However, because the megaconstellation satellites are in LEO they're subject to perturbations due to a non-spherical Earth, atmospheric drag (always present and varying as solar activity varies) and solar radiation pressure as well as deliberate manoeuvres by the satellite operator to, for example, correct their orbit back to a nominal state or, perhaps, avoid a predicted collision. Unfortunately TLEs, sometimes provided by the satellite operator and sometimes derived by calculating the orbit from observation, can quickly become out-of-date and don't contain any information on the accuracy of the orbit determination. The operator doesn't necessarily know *exactly* where their own satellite is and errors can creep in during observation or computation. The more accurately measured and timed observations that we can provide then the better we can, for example, predict satellite positions and take avoidance action when planning a long exposure.

The suggested new standard is the Celestrak-proposed Orbit Mean-Elements Message (OMM) format which can include covariance (accuracy) and other information. In practise this will enable satellite tracks to be predicted with a known margin of error that becomes greater the further in the future the prediction is made – eight hours in advance is about the limit before the accuracy degrades. This is very much the same as weather forecasting where the reliability is worse towards the end of a monthly forecast than for a daily forecast. Similarly, charts showing the predicted path of a hurricane have a curved

teardrop shape that's wider in the direction of travel as future predictions of the hurricane's position become less certain.

A software tool, *PassPredict*, is being developed for free use in the public domain that will use the latest orbital data and allow planning of observations to avoid satellite trails in the exposure.

The conference moved on to the Algorithms Working Group's report. This was chaired by Dr Jonathan McDowell (Harvard-Smithsonian Center for Astrophysics and, incidentally, a former Guildford AS member) who pointed out that, though there's good progress on development of software techniques to remove trails from images, it's never going to be perfect and sometimes the science data will simply be lost.

Dr Morgan Schmitz (Princeton University) introduced the *Trailfix* software being developed to identify the location of one or more satellite trails in images and, for each trail, create a mask whose envelope matches the envelope of the trail. The detection will be done using the Hough Transform (see https://en.wikipedia.org/wiki/Hough_transform) which can be used to detect straight lines amongst background noise (such as stars). This then enables the trail to be 'subtracted' from the image. In its 'simple mode' the software will be able to use details of the exposure and instruments used found embedded in image headers. It's also being developed with a more advanced 'deep learning mode' which will use training data to help 'tune' the trail detection algorithm for different instruments. It may also be able to use predictions output from the *PassPredict* software where predicted satellite trails can be used to inform the trail detection process. This emphasises the need for accurate position and timing measurements made by observers for input to the database used by *PassPredict*.

It's not as straightforward as painted above, however, as some satellites follow a slightly curved path across the sky and for some satellites with an uneven albedo, as they tumble they generate a 'dashed' trail with regions of high and low brightness and, in consequence, places where the trail is broad or narrow. Also, if the trail passes over an extended object (e.g. a nebula) it may be difficult to determine exactly where the edge of the trail stops and the object begins resulting in an imperfect mask and trail subtraction.

Dr Jan Siminski (Space Debris Office, ESOC) then gave more details of the *PassPredict* software mentioned above. The principal purpose of this software is to enable planning of an observation to avoid getting *any* trails across the image.

As input the software will use:

- A database containing ephemeris data and a list of satellite IDs
- Observatory parameters: Latitude, Longitude and Height
- Observation parameters: RA, Declination, Date/Time, Exposure time, Field-of-View (FOV) and Aperture
- Satellite physical and optical properties

For those parameters, the software will then scan through the satellite predictions and work out which, if any, satellites could pass through the FOV and spoil the image and provide an estimate of trail brightness. I could see a development of this where the astronomer specifies the details in the third bullet point above (except for the date/time) and the software locates times when the observation has the best chance of success. The brightness estimate will depend on the submitted professional

and amateur observations of the megaconstellation satellites from a range of locations and with different Sun-Satellite-Observer geometries to improve the brightness modelling algorithms.

Following a short talk by Pat Seitzer (University of Michigan) about the creation of a test suite of images for testing the effectiveness of the software being developed we returned to Jonathan McDowell for a discussion of a suite of simulation software (*EphemSimulate*, *ImageSimulate*, *TrailSimulate* and *TrailAssess*) to compare simulations with observational data. This will lead to improved modelling and better predictions of both position and brightness.

A question asked during the Q&A sessions highlighted the fact that spectroscopic observations will be compromised in a way that's difficult to recognise and correct. With an image, the trail of a satellite can be detected and, possibly, removed to the point where the image is still useful. However, with a spectroscopic observations the output is a spectrum not an image and it may not be obvious that the spectrum of the intended object (star, galaxy, nebula, etc) has been polluted by light from a satellite. Even if it were subsequently recognised that a satellite had passed through the instrument's FOV there's no trail to be removed as the photons from the satellite's trail now indistinguishably form part of the recorded spectrum. Also, given that spectroscopic exposures tend to be 5-6 times longer than normal imaging, there's a correspondingly greater risk of satellite interference.

Days 2 and 3 of the conference covered Policy and Community Engagement respectively.

The Policy Working Group are working on drawing up guidelines that it's hoped the national and international legislators will support to curb the wilder ambitions of the satellite operators. There's some progress here but it's slow and political interests, some of which are more invested in the growth of a US-dominated global internet, may interfere with that.

The Community Engagement Working Group highlighted the fact that some indigenous peoples will have their historic right to an unpolluted sky infringed if a large number of the satellites are bright. Many of the, for example, Polynesian islanders and North American and Canadian Indians have cultures based on a relationship with the sky and it was felt that they should be given more of a say.

Overall, SATCON2 was an extremely interesting and thought-provoking event and I hope you can see that some progress is being made.

For amateur astronomers it *will* mean that imaging sessions will be less spontaneous and will need to be well planned in advance. Use of the software tools now being developed, such as *PassPredict*, will help you to mitigate the risk of your images suffering intrusions from satellite trails and it may even be possible to 'fix' some images with only faint trails. An unplanned, Russian roulette approach to observing may leave you with a handful of images only suitable for submission to SatHub or Trailblazer!

Dr Paul A Daniels FRAS
August 2021



King's Lynn & District Astronomy Society are planning a series of events based on the Dark Skies found in North Norfolk. These are obviously dependent upon the Covid status and weather on the evenings in question. We have some arranged with the Norfolk Coast Partnership as part of the Norfolk Coast Dark Skies Festival 2021, see link to their web site below and with Burnham Deepdale Backpackers and Camping site, see their link below, and a couple purely on behalf of KLADAS:-

<http://www.norfolkcoastaonb.org.uk/partnership/dark-skies-festival-25-sep-10-oct-2021/1229>
<https://www.deepdalebackpackers.co.uk/camping/>

The events that King's Lynn & District Astronomy Society, KLADAS, are involved with are as follows:-

Monday 13th September: AGM followed by a talk - What the Egyptians did for Astronomy by Frank Dutton

Time: 19:30-21:30 Venue: At Tottenhill Village Hall if Covid allows failing that via Zoom

Monday 11th October: Talk by David Talbot – The History of the Space Shuttle

Time: 19:30-21:30 Venue: At Tottenhill Village Hall if Covid allows failing that via Zoom

Friday 24th & Saturday 25th September: Deepdale Autumn Fayre

Time: 18:00-22:00 Venue: Deepdale Camping & Rooms, 1 Deepdale Granary, Burnham Deepdale PE31 8DD. When Covid allows **King's Lynn & District Astronomy Society** do 2 nights with telescopes in the Spring for their Hygge and 2 nights in the Autumn for their Fayre. We set up telescopes so that the visitors can look at the night sky through our telescopes and be shown what you can see in a Dark Sky area and taught about what the celestial objects they are looking at actually are. The events are free to campers at the Deepdale site. Contact: 01485 210256

Saturday 25th September: Norfolk Coast AONB Dark Skies Festival launch

Time: 19:00-22:00 Venue: Thornham Village Hall

Organiser: Norfolk Coast Partnership

James Wild MP will officially launch the 2021 Norfolk Coast Dark Skies Festival which this year has a theme of nature and dark skies. Kate Dougan from the Norfolk Coast Partnership will describe the dark skies work in the AONB and John Craythorne from **King's Lynn & District Astronomy Society (KLADAS)** will give us tour of the skies. Following this, if weather permits, we also hope to do a spot of stargazing on the terrace. Refreshments will be provided.

The event is free of charge, but booking is essential <https://www.eventbrite.co.uk/e/norfolk-coast-aonb-dark-skies-festival-2021-launch-tickets-158882671347> If you would like to make a donation towards the festival on the night, you are most welcome to.

Contact: aonb@norfolk.gov.uk

Monday 27th September: Talk by Peter Shah - Astro Imaging From a Remote Observatory in Spain

Time: 19:30-21:30 Venue: Via Zoom

Saturday 2nd October: A guided tour of the night sky

Time: 19:00 till late Venue: Barrow Common Dark Sky Discovery Site

Organiser: King's Lynn and District Astronomical Society

Discover the wonders of the night sky from one of our Designated Dark Sky Discovery Sites with highly experienced astronomers from the **King's Lynn & District Astronomical Society**. There will be a collection of telescopes for people to see Jupiter, Saturn, galaxies, star clusters and much more. The event is subject to clear skies, please wear sturdy footwear and dress for all weathers. The event is free of charge, but booking is essential. To book your place phone John Craythorne on 01945 701038 or email jcraythorne43@gmail.com.

Tuesday 5th October: Online talk - Jupiter and Saturn - Giants of the Solar System

Time: 19:00-20:00 Venue: Online

Organiser: **King's Lynn and District Astronomical Society**

Guided by John Craythorne in this virtual talk, take a tour of our Solar System, particularly planetary giants Jupiter & Saturn which will be visible in the night sky during the festival.

To find out how you can join this online event, phone John Craythorne on 01945 701038 or email jcraythorne43@gmail.com.

More details and future events are available at westnorfolkastro.co.uk

World Space Week 2021

The United Nations General Assembly declares 4 to 10 October World Space Week to celebrate each year at the international level the contributions of space science and technology to the betterment of the human condition.

In 2021, World Space Week celebrates "Women in Space."

The poster, right, was created by Douglas Shuler from Lockheed Martin, and commemorates this year's WSW theme by depicting women from various areas of the space sector.

www.worldspaceweek.org



MISSION: MARS



GoSpaceWatch (United Kingdom) and 4CEE (Slovakia)
present an Online International Conference

Human Analogue Mars Missions

Saturday 9th October 2021

Hosted and Broadcast on Astro Radio: www.astroradio.earth

Lectures can be viewed live on YouTube at <https://www.youtube.com/c/AstroTVEarth>

Join our meeting on Zoom. Registration to be open soon.

Speakers: Karin Brünnemann (Slovakia): Austrian Space Forum AMADEE 2020; Igor Bobek (Croatia): The Mars Society; Prof. Julio Rezende (Brazil): Habitat Marte; Eleni Charitonos (Cyprus): Habitat LunAres Research Station and HI-SEAS

Organised by www.gospacewatch.co.uk and www.4cee.eu



Bridgend Astronomical Society to celebrate its 40th Anniversary!



Photo credit: Stephen Webber

On November 20th, Bridgend Astronomical Society in South Wales will celebrate its 40th anniversary. From humble beginnings in 1981, Joan Hawkins, Laurie Brophy and Frank Morris founded what was then called Bridgend Amateur Astronomical Society and it is with great pleasure that we have recently welcomed Joan Hawkins back to the society as a committee member. Joan will assist the rest of the hard-working committee team in ensuring every member gets the friendly welcome and support that have been features of BAS since 1981.

2020 saw our membership numbers soar as we took to social media and Zoom. BAS stayed connected with its 100+ paid members by offering thought-provoking talks, short courses, quizzes and the rare 'in-person' observation events where we could safely do so. Our membership is varied and thriving, and includes juniors, families, complete beginners and both amateur and professional astronomers, all taking full advantage of what the Society has to offer. Connections within the community such as local schools and organisations have also helped to raise the profile of BAS's friendly and helpful nature.

With COVID restrictions easing, BAS is planning to celebrate its 40th anniversary with a dinner event in November where current BAS members will be joined by some of the founders as our special guests to help commemorate a very special occasion.

BAS will continue this celebratory theme through its anniversary season with yet more short courses, family events, workshops and lectures for our loyal and enthusiastic members. Here's to the next 40 years of Bridgend Astronomical Society!

To find out more about BAS, visit our Facebook group or website www.bridgendifastro.org.uk

Jason Mead

Mid-Kent Astronomical Society



Mid-Kent Astronomical Society have continued to meet virtually twice monthly during the pandemic and have enjoyed great success via Zoom.

Given that some Covid restrictions remain in place, and considering individuals' own concerns for safety, MKAS are trialling an exciting hybrid meeting format that can be followed virtually or in person at our regular venue. One major advantage of the hybrid format is that our members in foreign climes will be able to enjoy the meetings and it will also enable us to engage speakers in the furthest reaches of the UK and even abroad.

There have certainly been advantages in meeting virtually during the pandemic. One of which is the fact that societies invite other groups to participate in their meetings.

Partnerships and friendships are being forged in this way.

Our own presentations include a general 'chit-chat' session after the meeting which have proved very popular and is something other societies have started to do. It is not uncommon for the evenings' presenter to join in and enjoy this with us.

One of our members hosted an extremely popular 'open day' in his garden to view the partial eclipse on June 10th accompanied by tea and scones, whilst others observed from various locations around Kent.

Meanwhile, our Chairman Ian Hargreaves enjoyed a successful interview on Radio Kent where he was able to describe and explain eclipse events to the public

MKAS does not host any events during the month of August, and we are unsure of exactly when we will meet again in person. However, we do have an interesting program of talks for the months ahead albeit in person or virtually.

It is fair to say that MKAS has used the pandemic to their advantage and their meeting format was noted by 'Astronomy Now' magazine as an example on how to be successful in these difficult times. In fact, we have grown our membership over the last 18 months!

For the months ahead we have:

10th September 2021

Jeremy Phillips - Shooting for the Stars

Virtual Presentation by Zoom

Jeremy is intoxicated by astrophotography's cocktail of art, science and wonderment. Most of his images are taken from light-polluted Streatham where he has lived for 21 years. His images range from nebulas to galaxies millions of light years away.

24th September 2021

Greg Smye-Rumsby: Solar Eclipses.

Virtual Presentation by Zoom.

Popular speaker Greg Smye-Rumsby returns to provide another entertaining presentation. This time on the subject of Solar eclipses. Viewing a total Solar Eclipse is regarded as one of life's

most spectacular experiences and should be on everyone's bucket list.

8th October 2021

Will Joyce - The Outer Planets

Virtual presentation by Zoom.

In this presentation Will summarises our current understanding of the outer planets in our Solar System and their most interesting natural satellites.

Plus, we have an exciting evening ahead on October 29th Rodney Buckland CBE and Prof David Rees - A virtual observing session with the Open University robotic telescope in Tenerife.

Virtual presentation by Zoom.

Rodney Buckland and David Rees explain how we can have free access to the Open University robotic telescope situated under the clear dark skies of Tenerife.

As a **special bonus** they have managed to book a slot so we can observe several stunning objects in real time.

For more information on our forthcoming events please visit www.midkentastro.org.uk/events

Dave Merrall

Press Secretary

Mid-Kent Astronomical Society

www.midkentastro.org.uk

press@midkentastro.org.uk



Carolian Astronomy Society: Going Back to School

Carolian Astronomy Society in Kidderminster, Worcestershire, begin their new 2021 – 2022 season in September. We are delighted to announce that we are going back to school!

Meetings will be held at our traditional location of The Science Theatre at King Charles 1 School on Comberton Road, Kidderminster with no rules on numbers or social distancing.

September will be our first real life meeting since February 2020. We have been conducting our meetings through video conferencing during the pandemic lockdown restrictions.

The first meeting is on Wednesday 8th September at 7:30 pm. Our Speaker is Dr Julian Onions from the University of Nottingham with a talk entitled "Aperture Fever: Does my Mirror look big in this?"

Full details about our meeting programme are on the Carolian AS website at:

www.carolianastro.co.uk

Michael Bryce
Chair, Carolian Astronomy Society



Alan Willison, Chairman - Hertford Astronomy Group has sent their forthcoming lecture programme. They are continuing on Zoom for the foreseeable future. More details can be found on their website below.

Wed, Sep 8, 2021	Roger O'Brien	Interstellar Communications
Wed, Oct 13, 2021	Russell Parry	The Appley Bridge Meteorite (Oct 13, 2014)
Wed, Nov 10, 2021	Matt Bothwell	The Invisible Universe
Wed, Dec 8, 2021	Charles Barclay	Henrietta Leavitt and the new Universe
Wed, Jan 12, 2022	Katherine Blundell	Time-Domain Astronomy

www.hertsastro.org.uk



Loughton Astronomical Society: Thriving In Lockdown

The LAS continues to go from strength to strength, with more members now than March 2020 before restrictions curtailed our meetings. The weekly programme has continued, unabated, on Zoom. We have been fortunate to have seen some of the most amazing presentations, both from our internal Society members and top astronomers and research scientists.

One particularly successful evening was a recent masterclass in astronomical sketching with the renowned Mary McIntyre, who in the course of just a few hours allowed us to discover our inner hidden artistic talent.

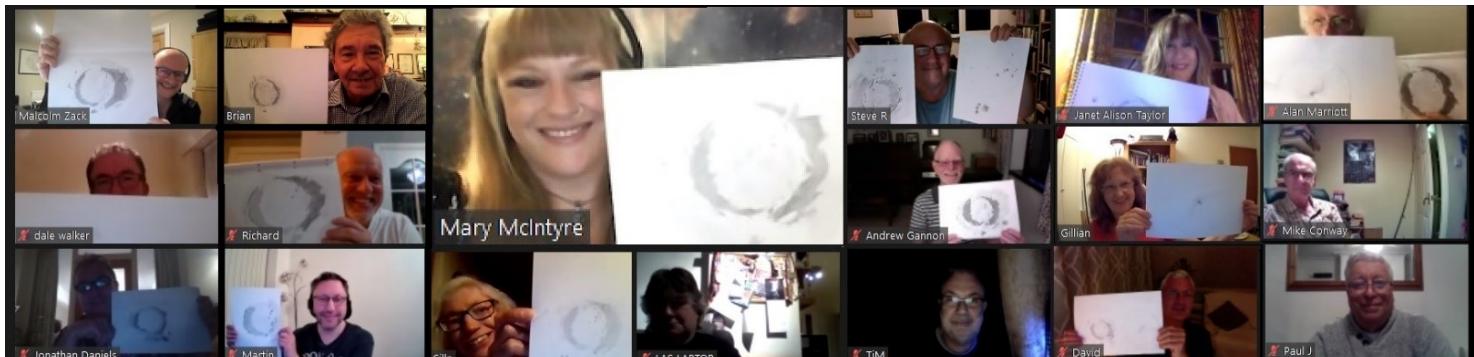
The Society's imagers have developed their skills and expertise, able to stay up later knowing the morning commute has been replaced by falling out of bed and starting the "home office". Astounding images have been produced which may be seen on the Gallery page of our website.

Our junior section, AstroKyds, has also continued to meet monthly on Zoom during the restrictions. I am sure we have some budding scientists in the making.

A busy WhatsApp group has allowed Members to stay in touch on an immediate basis; shout-outs for immediate events, latest projects, images, questions and even some excellent banter has meant we have stayed in touch and done what every astronomer wants of an Astro Society – comradeship and support.

Looking forward and subject to restrictions lifting, we hope to return to face-to-face meetings in the late summer. An outdoor BBQ will kick off contact, strangely without a yellow rectangle around the speaker! Planning is underway for another Autumn Equinox Star Camp at Kelling Heath. Watch this space <https://www.las-skycamp.org>

Lockdown has allowed us to concentrate on redeveloping our website which gives full details of our activities over the coming months: www.las-astro.org.uk in turn linked to a Flickr page of Members images.



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Moray Astronomy Club, SIGMA

The George Fraser Memorial Lecture 2021

Friday 3rd September at 7:30 pm

Free event online via this link:

<https://youtu.be/X8Brypr-Ups>

SIGMA is to host the 3rd Memorial Lecture in honour to the local Moray born physicist Professor George Fraser.

"Preparing for Space Settlements Using Microbes"

By Prof Charles Cockell
University of Edinburgh

Followed by usual SIGMA sections of a guide of the night sky and Space news.

The biennial Memorial Lecture is given in honour of Prof. George Fraser (1955-2014), who was born and brought up in Burghead in Moray, and went on to become Professor of Detector Physics and Director of the Space Research Centre of the University of Leicester and an internationally-renowned figure in space research.

SIGMA is also pleased to announce that this meeting is in association with The Orkney International Science Festival.

FAS Newsletter Copy Deadline:

Deadline for items for inclusion in the next FAS Newsletter, No 124 December 2021 is
Friday 19th November 2021
Please email items to newsletter@fedastro.org.uk