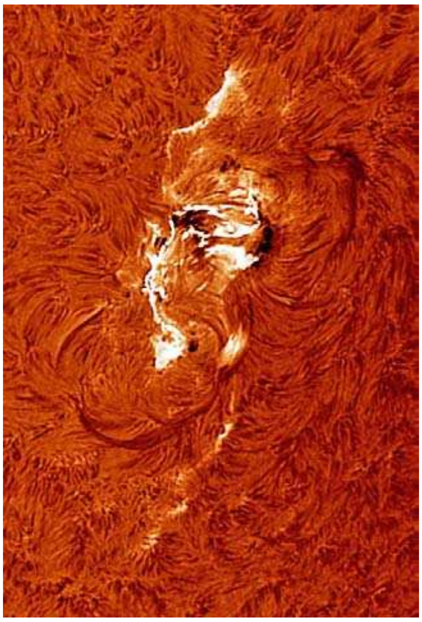
eye from Sep 1 to 8 inclusive.

AR2680 N09°/316° appeared over the NE limb on Sep 10 as a single penumbral sunspot type Hsx. This small sunspot was the only sunspot on the photosphere until Sep 20 and had a maximum area of 110 millionths on Sep 15 when the group was type Hax. The group reached the NW limb on Sep 22.

AR2681 S15°/179° rotated over the SE limb on Sep 20 another small penumbral sunspot type Hsx with an area of 100 millionths. This group rotated across the disk largely unchanged and started to fade on Sep 29 but was still present the following day approaching the limb.



X class flare in AR2673 on 2017 Sep 06 imaged by Gary Palmer

AR2682 S11°/124° (likely return of AR2673) appeared over the SE limb on Sep 24 type Hsx. By Sep 28 a line of pores extended towards the south east and a faint cluster of pores were forming to the north of the main sunspot, type Cai with an area of 170 millionths. No further development was reported through to the end of the month.

AR2683 N14°/111° (likely return of AR2674) appeared over the NE limb on Sep 24 type Cki. By Sep 28 the group was the largest sunspot on the disk, an irregular penumbral sunspot with an estimated area of 330 millionths. The group was unchanged on Sep 30 approaching the CM.

17 observers reported a Quality number of 8.42 for September.

H-alpha

Prominences

21 observers reported a prominence MDF of 2.24 for September.

Surge prominence imaged by Pete Lawrence on 2017 Sep 09 at 08:50 UT.

Prominence activity remained low during September. A prominence hearth persisted on the NW limb between Sep 1 & 3 with another hearth on the SE limb persisting between Sep 1 & 5. Post flare loops were reported on the NW and SW limbs on Sep 9 and on Sep 10 a large double looped event emanating from an X9 class flare was reported on the W limb estimated to reach a height of 93,000km. A thin spike prominence was also reported on the W limb in the wake of AR2673.

All other prominences reported to the end of the month were small and unremarkable.

Bi-polar magnetic regions, filaments & plage

17 observers reported a filament MDF of 2.04 for September.

A post flare filament was seen forming within AR2674 on Sep 1 around 15:50UT. Plage was reported with ARs 2673, 2674 and 2675.

On Sep 13 AR2680 was preceded by a small bipolar magnetic region containing some very pronounced ‘blobs’ of filament at the following end of the BMR. The two parts of the BMR were separated by a crooked line of bright plage. A line of dark filament was also seen to the north of AR2680 extending across and dividng a fainter BMR.

By Sep 15 a few short dark filaments remained near AR2680 and the underlying BMR was visible but not conspicuous. A string of filaments was seen on the disk on Sep 16 stretching over 200,000km. Plage was also noted with AR2680.

AR2681 displayed plage on Sep 22 and two filaments were associated with the group. On Sep 26 short filaments were associated with AR2681 and AR2682 and plage was associated with both groups and AR2683.

A filament around 90,000 km long was reported in the SW quadrant on Sep 27. On Sep 28 the BMR surrounding AR2682 was showing more dynamic activity, plage and dark filaments than those associated with AR2683. The BMR surrounding AR2682 measured approximately 245,000km across NE to SW axis and over 300,000km across NW to SE axis.

A large filament was seen near the W limb on Sep 30 measuring around 180,000km in length and plage was noted with ARs 2681, 2682 and 2683.

Flares

15 observers reported flares throughout the month primarily from AR2673 and AR2674. SWPC//NOAA recorded 4 X class flares from AR2673 including the strongest flare recorded for a decade:

Event					
7250	Sep 06	X 2.2	08:57	09:10	09:17
7340	Sep 06	X 9.3	11:53	12:02	12:10
7780	Sep 07	X 1.3	14:20	14:36	14:55
9040	Sep 10	X 8.2	15:35	16:06	16:31

CaK

Generally there was little CaK activity during the month. On Sep 24 bright CaK plage was seen directly under a prominence on the E limb, AR2682 appearing over the limb thereafter.

Lyn Smith, *Director*

Comet Section

Comet prospects for 2018

Of the three periodic comets that should come into binocular range, two may be visible to the naked eye.The other is a Halley-type comet last seen at its 1980 return, which is likely to be a well condensed object and therefore easier to see than some of the more diffuse periodic comets. One long period comet may be visible in binoculars, but is best seen in the morning sky.

These predictions focus on comets that are likely to be within range of visual observers, though comets often do not behave as expected and can spring surprises. Members are encouraged to make visual magnitude estimates, particularly of periodic comets, as long term monitoring over many returns helps understand their evolution. Please submit your magnitude estimates in ICQ format. Guidance on visual observation and how to submit estimates is given in the BAA *Observing Guide to Comets*. Drawings are also useful, as the human eye can sometimes discern features that initially elude electronic devices.

Theories on the structure of comets suggest that any comet could fragment at any time, so it is worth keeping an eye on some of the fainter comets, which are often ignored.

They would make useful targets for those making electronic observations, especially those with time on instruments such as the Faulkes telescopes. Such observers are encouraged to report electronic visual equivalent magnitude estimates via COBS. When possible use a waveband approximating to Visual or V magnitudes. These estimates can be used to extend the visual lightcurves, and hence derive more accurate absolute magnitudes. Such observations of periodic comets are particularly valuable as observations over many returns allow investigation into the evolution of comets.

In addition to the information in the BAA *Handbook* and on the Section web pages, ephemerides for new and currently observable comets are on the JPL, CBAT and Seiichi Yoshida’s websites. The BAA *Observing Guide* *to Comets* is available on the Section web page: **https://britastro.org/node/6817**.

21P/Giacobini–Zinner is the parent comet of the October Draconid meteors. On this return no significant activity from dust trail encounters is expected. The comet was first discovered by Michael Giacobini at Nice observatory in 1900 December and was thought to have a period of 6.8 years. The next two returns were expected to be difficult to observe, but in 1913 October, Ernst Zinner, of Bamberg, Germany, discovered a comet whilst observing variable stars in Scutum. This turned out to be the same comet, but the period had been incorrectly determined and was actually 6.5 years.

The comet was missed at three unfavourable returns, so the 2012 return was its fifteenth apparition. 2018 is a very good apparition and at its closest in September the comet will be 0.39 au from the Earth. It comes within visual range in June and brightens rapidly. It could be a naked eye object by the end of August and remain visible to the naked eye throughout September. By then it is moving south and back into the morning sky, but keen UK observers should be able to follow it until the end of October. It passes relatively near quite a few open clusters. First, it is some 4° from the cluster M39 on July 4, but is much fainter than the cluster. It passes just over a degree from open cluster NGC 1502 around August 27, then M37 around September 13 and M35 a week later. It reaches NGC 2264 on September 26 and NGC 2301 at the beginning of October, with M50 and NGC 2343 a few days later and NGC 2362 at the end of the month.

29P/Schwassmann–Wachmann is an annual comet that has outbursts, which over the last decade seem to have become more frequent, though this could just reflect more intense observing coverage. Richard Miles has developed a theory that suggests that these outbursts are in fact periodic, and arise from at least four independent active areas on the slowly rotating nucleus. The activity of the active areas evolves with time. The comet is an ideal target for electronic observations and should be observed at every opportunity. It is in solar conjunction in February. The comet creeps into the northern celestial sphere around the time of opposition in September when it is in Pisces.

Halley-type comet **38P/Stephan–Oterma** was observed by the Section at its last return in 1980/'81, when it reached 9th magnitude. Sky conditions were very different then, when I was able to observe the well condensed comet in 10×80B from Cambridge Observatory. The comet was actually discovered by Jerome Coggia at the Marseilles Observatory, but the credit was taken by the Observatory Director, E. J. M. Stephan, who obtained the first accurate position. It was then lost until a comet found in 1942 by Liisi Oterma at Turku, Finland was computed to be a return of Stephan's comet. It should come within visual range in September as it brightens rapidly on its way to the November perihelion. It will be at its brightest in November, when it is in the late evening sky and remains well placed into 2019.

Carl A. Wirtanen discovered **46P/Wirtanen** at Lick Observatory in 1948. It is in a chaotic

Comets reaching perihelion in 2018

Comet	*T*	*q*	*P*	*N*	H_1	K_1	*Peak mag*
D/Brooks (1886 K1)	Oct 11.8	1.88	6.69	1			
D/Denning (1894 F1)	Feb 4.0	1.66	9.81	1			
D/Swift (1895 Q1)	Jun 28.0	1.39	7.18	1			
P/LINEAR–Skiff (2001 R6)	Oct 4.2	2.19	8.55	1	13.0	10.0	17
P/Catalina (2011 CR_{42})	Jun 22.6	2.52	6.58	1	13.0	5.0	16
P/PANSTARRS (2013 CU_{129})	Jun 24.3	0.80	4.88	1	15.2	10.0	11
P/Catalina–PANSTARRS (2013 R3)	Dec 6.4	2.20	5.28	1	14.0	10.0	18
PANSTARRS (2015 O1)	Feb 19.1	3.73			6.5	10.0	15
Lemmon (2015 XY_1)	Apr 29.9	7.93			5.5	10.0	19
PanSTARRS (2016 M1)	Aug 10.2	2.21			5.0	10.0	9
PanSTARRS (2016 N6)	Jul 18.2	2.67			7.0	10.0	14
Kowalski (2016 Q4)	Jan 26.6	7.09			7.0	10.0	19
PanSTARRS (2016 R2)	May 9.6	2.60			3.0	10.0	9
PanSTARRS (2017 K1)	Mar 27.7	7.26			7.0	10.0	20
ATLAS (2017 K4)	Jan 8.0	2.65			10.0	10.0	17
Jacques (2017 K6)	Jan 3.2	2.00			11.0	10.0	15
TOTAS (2017 M5)	Jun 25.7	6.00			6.5	10.0	18
P/PanSTARRS (2017 P1)	Jun 18.6	5.44	22.1	1	10.0	10.0	21
PanSTARRS (2017 S3)	Aug 16.0	0.21			11.0	10.0	4
Catalina (2017 S6)	Feb 26.9	1.54			12.5	10.0	16
Heinze (2017 T1)	Feb 21.5	0.58			12.5	10.0	10
3D/Biela	Feb 23.3	0.80	6.57	6			
3D/Biela-A	Oct 3.6	0.81	6.60	2			
21P/Giacobini–Zinner	Sep 10.3	1.01	6.54	15	5.4	30.8	4
26P/Grigg–Skjellerup	Oct 1.8	1.08	5.23	20	12.0	40.0	15
37P/Forbes	May 4.1	1.61	6.43	11	9.5	10.0	12
38P/Stephan–Oterma	Nov 11.0	1.59	38.0	3	3.5	30.0	9
46P/Wirtanen	Dec 13.0	1.06	5.44	11	8.2	15.9	3
48P/Johnson	Aug 12.2	2.00	6.54	10	5.6	15.0	10
49P/Arend–Rigaux	Jul 15.5	1.43	6.74	10	9.6	10.0	13
59P/Kearns–Kwee	Sep 16.8	2.36	9.53	6	7.5	20.0	16
60P/Tsuchinshan	Dec 11.2	1.62	6.58	8	10.5	15.0	14
64P/Swift–Gehrels	Jun 14.4	1.38	9.34	6	9.0	20.0	13
66P/du Toit	May 19.1	1.29	14.9	3	12.0	9.5	13
74P/Smirnova–Chernykh	Jan 26.7	3.54	8.48	6	5.0	15.0	15
79P/du Toit–Hartley	Sep 13.3	1.12	5.05	6	14.0	15.0	16
82P/Gehrels	Jun 28.6	3.63	8.43	5	7.5	15.0	18
105P/Singer Brewster	Aug 10.3	2.04	6.46	5	12.5	15.0	18
107P/Wilson–Harrington	May 23.5	0.97	4.26	10	15.0	5.0	16
125P/Spacewatch	Aug 28.0	1.52	5.52	5	15.5	10.0	19
130P/McNaught–Hughes	Jan 21.8	1.82	6.22	4	12.5	10.0	17
133P/Elst–Pizarro	Sep 20.8	2.66	5.62	5	12.0	10.0	17
137P/Shoemaker–Levy	Dec 13.4	1.93	9.61	3	14.5	10.0	18
143P/Kowal–Mrkos	May 7.3	2.53	8.91	3	14.0	5.0	17
159P/LONEOS	May 22.8	3.63	14.2	2	10.0	10.0	18
164P/Christensen	May 31.4	1.69	7.01	3	11.0	10.0	15
169P/NEAT	Apr 29.6	0.60	4.20	6	16.0	5.0	16
185P/Petriew	Jan 27.7	0.93	5.46	3	10.7	19.6	11
187P/LINEAR	May 26.6	3.88	9.86	2	9.0	10.0	17
197P/LINEAR	Jan 28.8	1.06	4.85	3	16.5	5.0	18
198P/ODAS	Dec 13.9	2.01	6.84	3	10.5	15.0	15
235P/LINEAR	Mar 17.5	2.73	7.97	2	12.0	10.0	18
240P/NEAT	May 16.2	2.13	7.62	2	12.0	10.0	18
243P/NEAT	Aug 26.0	2.45	7.50	2	12.5	10.0	17
245P/WISE	Feb 8.0	2.16	8.06	2	14.0	10.0	19
247P/LINEAR	Dec 2.1	1.49	7.91	2	17.5	5.0	18
250P/Larson	Feb 1.5	2.21	7.21	3	14.5	10.0	18
253P/PANSTARRS	May 7.7	2.04	6.46	3	14.5	10.0	20
267P/LONEOS	Jul 22.3	1.24	5.76	2	19.5	10.0	20
282P/PANSTARRS	Apr 11.7	2.40	5.59	1	15.0	10.0	20
300P/Catalina	Nov 2.1	0.83	4.44	3	17.5	10.0	17
350P/McNaught	Jan 29.3	3.75	8.33	2	14.0	10.0	22
357P/Hill	May 29.0	2.53	9.44	2	15.5	10.0	22
358P/PANSTARRS	Apr 11.7	2.40	5.59	2	15.0	10.0	20
361P/Spacewatch	Jul 2.5	2.78	11.0	2	12.0	10.0	18

The date of perihelion (T), perihelion distance (q), period (P), the number of previously observed returns (N), the magnitude parameters H_1 and K_1 and the brightest magnitude (which must be regarded as uncertain) are given for each comet. 3D has not been seen since 1852. The magnitudes, orbits, and in particular the time of perihelion of the single apparition D/ comets are uncertain. Note: $m_1 = H_1 + 5.0 * \log(d) + K_1 * \log(r)$

orbit, and its perihelion distance was much reduced due to approaches to Jupiter in 1972 and '84. It has been reported to outburst, but BAA data suggest that it was merely rejuvenated after the perihelion distance was reduced. A December perihelion gives a close approach to the Earth and this will be achieved this year, when the comet passes 0.078 au from us.

46P/Wirtanen will be a target for a Pro-Am observing campaign, so observations this year are particularly valuable. The comet may come into visual range in August, but it is then at a southern declination. UK visual observers may have a brief observing window in the early hours in September, when although it is still moving south it has brightened sufficiently that it may be visible above the sky glow. Otherwise we have to wait until the comet begins its rush north in November, when it may already be within binocular range. It is conveniently placed in our evening sky throughout December, when it may be visible to the naked eye. Indeed, the coma is likely to be very large due to its proximity, and the naked eye will be the best detector to use! The comet remains well placed as it fades into 2019 March.

48P/Johnson was discovered by Ernest Johnson at the Union Observatory in South Africa in 1949, following a very close approach to Jupiter in 1931. It is now in a stable orbit between Mars and Jupiter and no close approaches are predicted for some centuries. At favourable apparitions, such as its first two returns, it has reached 13th magnitude. The next three returns were unfavourable, with the comet reported to reach only mag 18. Returns have now improved, and this is the closest perihelion passage for over a century. At the last return it reached 14th magnitude and it could be at least a couple of magnitudes brighter this time, though it will be best seen from the southern hemisphere.

185P/Petriew makes its fourth return, and although predicted to reach 11th magnitude, it will be a difficult object low down in the evening sky in the first few months of the year.

P/PANSTARRS (2013 CU_{129}) is an intrinsically faint comet, however it makes a relatively close pass of 0.24 au to the Earth in 2018 July when it may reach 11th magnitude. It is at a southern declination at this time, so will be a southern hemisphere target.

2016 M1 (PanSTARRS) is in solar conjunction in January and is heading towards a high southern declination as it emerges. For southern observers it should be picked up in early March and will be at its brightest of around mag 9 throughout April and May.

2016 R2 (PanSTARRS) could be 9th magnitude at the start of the year, however the magnitude parameters are currently uncertain and it might be brighter. It is well placed for observing by northern hemisphere observers. Despite not being at perihelion until May it will slowly fade as its increasing distance from the Earth compensates for its decreasing distance from the Sun. It might be mag 12 by the end of the year.

2017 S3 (PanSTARRS) should come within visual range in July and brighten rapidly, reaching binocular visibility by the end of the month. It will be seen best in the morning sky, though it is at a high northern declination. At the end of the month it passes close to open cluster NGC 2281. It enters solar conjunction in early August and then remains too close to the Sun for further observation. It is intrinsically faint and with perihelion at 0.2 au it might not survive perihelion. If it does it might just be bright enough to be visible in the SOHO C3 coronograph towards the end of August.

2017 T1 (Heinze) is another intrinsically faint comet, however it passes close to the Earth on its way to perihelion and could reach 10th magnitude as it does so. Closest approach is 0.22 au on January 4, and it is then at high northern declination and convenient for viewing in the early evening. The orbit has a miss distance of 0.014 au, and therefore a meteor shower might be possible. The comet moves rapidly across the sky, and becomes poorly placed after early February.

The other periodic and parabolic comets that are at perihelion during 2018 are unlikely to become brighter than mag 11 or are poorly placed. Ephemerides for these can be found on the CBAT or other WWW pages. Several D/ (disappeared) comets have predictions for a return, though searches at favourable returns in the intervening period have failed to reveal the comets and the orbits will have been perturbed by Jupiter. There is however always a chance that they will be rediscovered accidentally by one of the Sky Survey patrols.

Looking ahead to 2019 (or strictly 2020), there is only one additional periodic comet that is likely to be of significance. This is comet 289P/ Blanpain, which was observed in 1819, then lost until re-discovered by the Catalina Sky Survey in 2003, when it passed 0.025 au from the Earth. It makes another close pass at 0.089 au in early 2020, when it might reach 5th magnitude and is well placed throughout the period when it is close to us. Three of the comets described above will also be on view.

Jonathan Shanklin, *Visual observations coordinator*

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Commission for Dark Skies

Enlightening DEFRA (again)

It remains a sad fact that the night sky is the only part of our environment with no protection at all in law, and that the only UK legislation on where light goes is the Clean Neighbourhoods and Environment Act (section 102) of 2005, which deals only with obtrusive light into premises. The BAA Commission for Dark Skies (CfDS) seeks occasional meetings with Government departments who might be able to influence policy on lighting. On 2017 September 26, CfDS coordinator Bob Mizon and James Abbott (CfDS Essex) met DEFRA Nuisance Team members Lewis Baker, Richard Mitchell and David Bowers.

The CfDS members had suggested in advance three key points to be discussed:

1 The concept of 'permitted development' in planning law, and in the National Planning Policy Framework, whose clauses fail to capture much of modern lighting. For example, domestic and commercial exterior lighting is permitted under planning regulations if it does not materially affect the appearance of a building – but only during the daytime (!). This means that glaring, intrusive and environmentally damaging lighting is uncontrolled and hard to contest. Extravagant and inappropriate 'decorative' lighting, such as the all-night floodlighting of trees (and their countless inhabitants) is commonplace. There is no check on the installation of very bright blue-rich lighting, which mimics daylight and, according to sleep experts and environmentalists the world over, creates health issues for both humans and wildlife.

Cheap, imported LED floodlight in the New Forest National Park. No control of brightness or direction. (*Bob Mizon*).

2 The pressing need to apply the precautionary principle to over-bright and blue-rich LED lights. LEDs are a double-edged sword. On the positive side, they are cheap and can easily be downward-directed; they are energy-efficient, with consequential environmental benefits. They can be motion-operated, easily dimmed and remotely controlled, enabling them to be used in applications where lighting