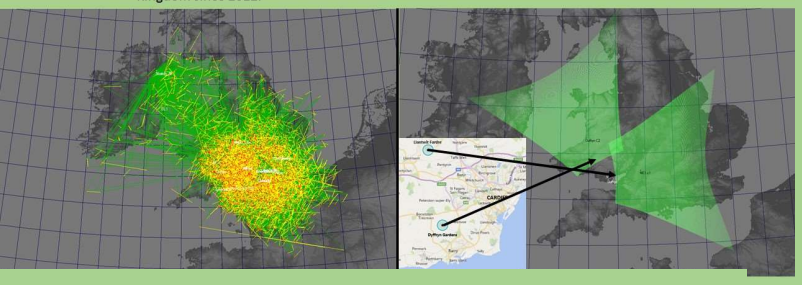
Cardiff Astronomical Society participation in UKMON network

Map of **30 permanently** set up UKMON stations covering skies over United Kingdom showing calculated (yellow) meteor trails of 19,022 orbits from 114,749 meteors recorded over United Kingdom since 2012.

Map showing the location and sector views of the two UKMON cameras operated and maintained by Cardiff Astronomical Society.



CAS – Meteor Observation – Edward Cooper (CAS UKMON Coordinator)

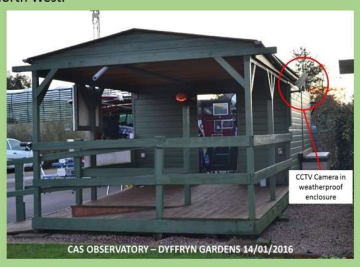
Cardiff Astronomical Society (CAS) have been recording meteor, sprite and fireball events since joining the United Kingdom Meteor Observation Network (UKMON) in November 2013.

UKMON was set up in early 2012 with the aim of it becoming the first UK-wide network using CCTV cameras to capture meteor trails across night sky and the following objectives:

- Establish a network of relatively cheap CCTV cameras to monitor continuously meteor activity over the UK;
- Assist members with analysis of meteor data and publishing papers;
- Enable members to contribute to, and collaborate with, other networks across Europe using video data acquisition technology;
- Bring together individuals who are already working independently;
- Encourage involvement by individuals and organizations (including astronomy societies, schools and colleges);
- Provide a platform for sharing knowledge and experience.

In September 2013 UKMON members from across the South of England and South Wales came together for the first time in an informal gathering held at the Norman Locker Observatory, Sidmouth. Over 20 people attended the event from Hampshire AG, the NLO Solar, Planetary and Meteor Detection Group, Cardiff AS, Newbury AS, and Farnham AS. Bob Love & Claude Vallee from CAS were captured by the camera.

CAS have two static cameras in operation each with a different direction of view, the different direction of view is important to link in with the rest of the camera network operated under the UKMON banner. CAS Camera 1 is located at Llantwit Fardre under the supervision of Martin Chick, the axis of the field of view is to the East. I look after CAS Camera 2 which is located at the CAS Observatory in Dyffryn Gardens, the axis of the field of view is to the North West.



The installation at the CAS Observatory consists of a CCTV camera in a weatherproof enclosure connected via a video decoder to a standard PC with a large hard drive for data storage. The PC is powered via an Uninterruptable Power Supply to try to protect the system from power outages. The PC has an application (UFOCapture) which is a motion detection program that scans the video stream for moving objects and when an object is detected, UFOCapture developed by SonotaCo in Japan writes a short AVI (movie clip) sequence to the computer hard disk.

With a remote acquisition station, the data is transferred monthly for further analysis. There are a number of steps to be completed before the processed data is uploaded to a central database maintained by UKMON where the data can then be integrated with the observations from other stations.

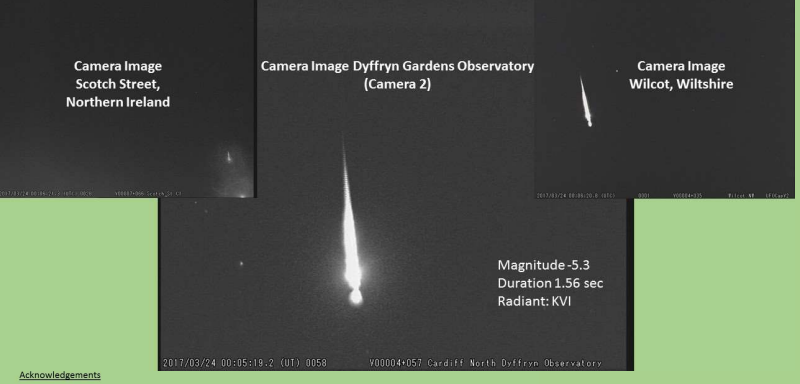
Typically, the raw data is scanned and edited by eye to remove events that are evidently not natural events such as planes, helicopters, birds, insects and even laser pens used at Stargazing events. Once this reduction has been completed an image is selected which has a good selection of stars visible, using this image there is an iterative process conducted within UFOAnalyser to confirm the orientation of the camera using the stars to confirm alignment. The next step is to process a batch (one month's data) of AVI files this will determine the types of event recorded, performs photometric and astrometric analysis to determine meteor properties and, if applicable, associates the meteor with a particular shower. Within this data there will be some events (too faint, too bright, too slow or just in view) which cannot be automatically identified and hence could not be categorised by the automatic process; for this data it is necessary to apply a manual approach to provide some assistance/guidance to the processing software.

Having completed the processing, the data is then uploaded to the central database.

In 2016 the UKMON network recorded 40,685 single meteors and 7,692 unified observations from 36 camera sites.

Reference to the NEWS tab at http://www.ukmeteornetwork.co.uk/ will give insight into some of the more significant United Kingdom meteor events since 2012.

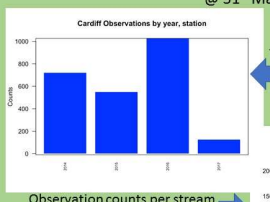
Cardiff Fireball 24th March 2017 00:05:19 UT



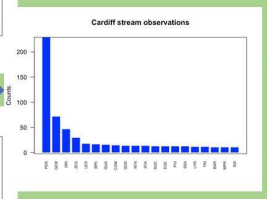
Acknowledgements

- UKMON (UK Meteor Observation Network) https://ukmeteornetwork.co.uk/
- Royal Observatory Greenwich 2017 Guide to the Night Sky by Storm Dunlop and Wil Tirion Published by Collins
- International Meteor Organization http://www.imo.net/news/
- American Meteor Society http://www.amsmeteors.org/
- Dunsink Observatory, Dublin https://www.dunsink.dias.ie/
- National Trust Dyffryn Gardens, Vale of Glamorgan https://www.nationaltrust.org.uk/dyffryn-gardens
- Cardiff Astronomical Society http://www.cardiff-astronomical-society.co.uk/

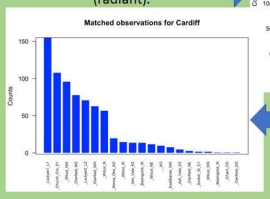
Summary Report of All Observations (Cardiff) – 2 cameras @ 31st March 2017



To-date Cardiff Astronomical Society have recorded 2427 individual meteor observations. 697 sporadic meteors and 1730 stream meteors.



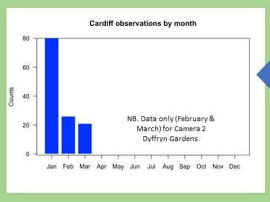
Observation counts per stream (radiant).



Locations and counts for stations matching observations with Cardiff.

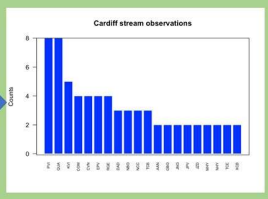
Fireball activity		(based on IAU definition of apparent magnitude of -4.0 or greater)	
Date / Time (UT)	Magnitude	Duration	Stream
2015-08-13 02:51:03	-7.2	0.48	PER
2016-12-22 03:18.37	-7.2	0.38	COM
2016-08-11 23:33:52	-5.9	0.14	BPE
2017-03-24 00:05:19	-5.3	1.56	KVI
2016-08-06 03:54:48	-4.9	0.5	GER
2016-08-11 23:04:01	-4.9	0.6	PER
2014-08-13 02:13:04	-4.7	0.64	PER
2014-08-15 03:56:22	-4.5	0.44	PER
2016-07-22 00:49.15	-4.5	1.14	CAP
2016-08-13 03:40:28	-4.5	0.3	AIC
2014-11-04 22:44:22	-4.4	1.3	OEE
2016-03:30 01:46:48	-4.4	0.42	AAL
2014-12-01 02:58:58	-4.3	0.56	SPO
2015-08-08 00:53:25	-4.3	0.82	PER
2016-08-16 23:29:09	-4.3	1.08	PER
2014-09-09 03:04:02	-4.1	0.66	SPO
2014-08-13 00:41:10	-4.0	0.56	MPR
2014-09-16 21:38:21	-4.0	1.22	SPO
2014-10-24 06:03:32	-4.0	0.12	SPO
2015-08-07 01:13:31	-4.0	0.66	PER
2016-01-04 22:14:29	-4.0	0.86	COM
2016-08-04 21:31:39	-4.0	1.14	ZCS
2016-08-12 00:27:11	-4.0	0.88	PER

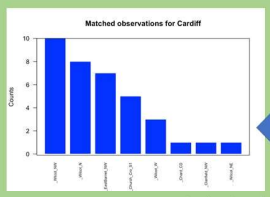
Summary Report of Activity in 2017 (Cardiff) – 2 cameras @ 31st March 2017



So far in 2017 Cardiff has recorded in excess of 127 individual meteor observations. These comprise 33 sporadic meteors and 94 stream meteors.

Observation counts by stream for the most frequent showers based on preliminary analysis.





Locations and counts for stations matching observations with Cardiff.

Principal Meteor Showers in 2017

Shower	Dates of activity 2017	Date of maximum 2017	Possible hourly rate
Quadrantids	January 1 - 10	January 3-4	120
April Lyrids	April 16 - 25	April 22-23	18
Eta Aquarids	April 19 - May 26	May 6-7	55
Alpha Capricornids	July 11 to August 10	July 27-28	5
Perseids	July 13 to August 26	August 12-13	100
Delta Aquarids	July 21 to August 23	July 28-29	< 20
Alpha Aurigids	August to October	August 28 & September 15	10
Southern Taurids	September 7 to November 19	October 23-24	< 5
Northern Taurids	October 19 to December 10	November 11-12	< 5
Orionids	October 4 to November 14	October 21-22	25
Leonids	November 5 - 30	November 17-18	< 15
Geminids	December 4 - 16	December 13-14	100+
Ursids	December 17 - 23	December 21-22	< 10

Composite images of 2015 Perseid meteor shower

14 October 2015 by **Richard Kacerek, UKMON**

Every year UKMON observe large number of meteor showers totaling over 20,000 meteors. The Perseid meteor shower is probably the most observed shower, mainly thanks to nice August temperatures, people venture outside to enjoy this spectacular show. For the second year in a row UKMON was fortunate to observe the Perseid meteor shower and bring it to screens worldwide.

Each composite image includes about 50 meteors on average captured only during the peak night.

METEORS

Sarah Joyce, Megan O'Driscoll, Jamie Columb (Castleknock Community College), Fionn Munnelly (Mount Temple Comprehensive School), & Aaron Earley (Patrician Secondary School Newbridge.)

SPEED ~ meteors range in speed from 11km/s to 72km/s.

HEIGHT ~ most meteors burn up in the mesosphere which ranges from 50km to 85km above the Earth's surface.

SIZE ~ meteors are considered to be a body bigger than a molecule but smaller than 100m.

TYPES ~ the 3 main substances meteors are composed of are iron, rock and a mixture of both.

- Meteor showers are caused by big showers of dust orbiting the sun and when the Earth passes through the debri field behind a comet.
- A meteor shower is when a number of meteors are seen to originate from 1 point in the sky.

METEORS IN OUR ATMOSPHERE

A 'Bolide' is a meteor that is extremely bright when entering the atmosphere but then explodes and reaches a magnitude of 14, twice as bright as the moon.

A 'Superbolide' is a meteor that reaches a magnitude of 17 or brighter. One was recently visible in Chelyabinsk, Russia.

Meteors usually hit the Atmosphere going at tens of thousands of miles an hour meaning there is a sonic boom and a very big shockwave resulting in the meteor breaking into many pieces and burning up.

When the meteor hits our atmosphere, the temperature between the air and the meteor can reach up to 1700 degrees C.

Roughly 44 tonnes of meteorites fall to Earth every day. Around 170 meteorite craters discovered since 1920. There have been over 50,000 Meteorites discovered on Earth.

Meteorites are similar to Earth rocks but have a burnt layer on their surface. Most meteors don't survive the friction of the Earth's atmosphere and burn up before being able to make a crater. The largest meteorite ever found weighed about 66 tonnes and was found in Namibia by a farmer

Extract from a poster shown at Dunsink Observatory, Dublin