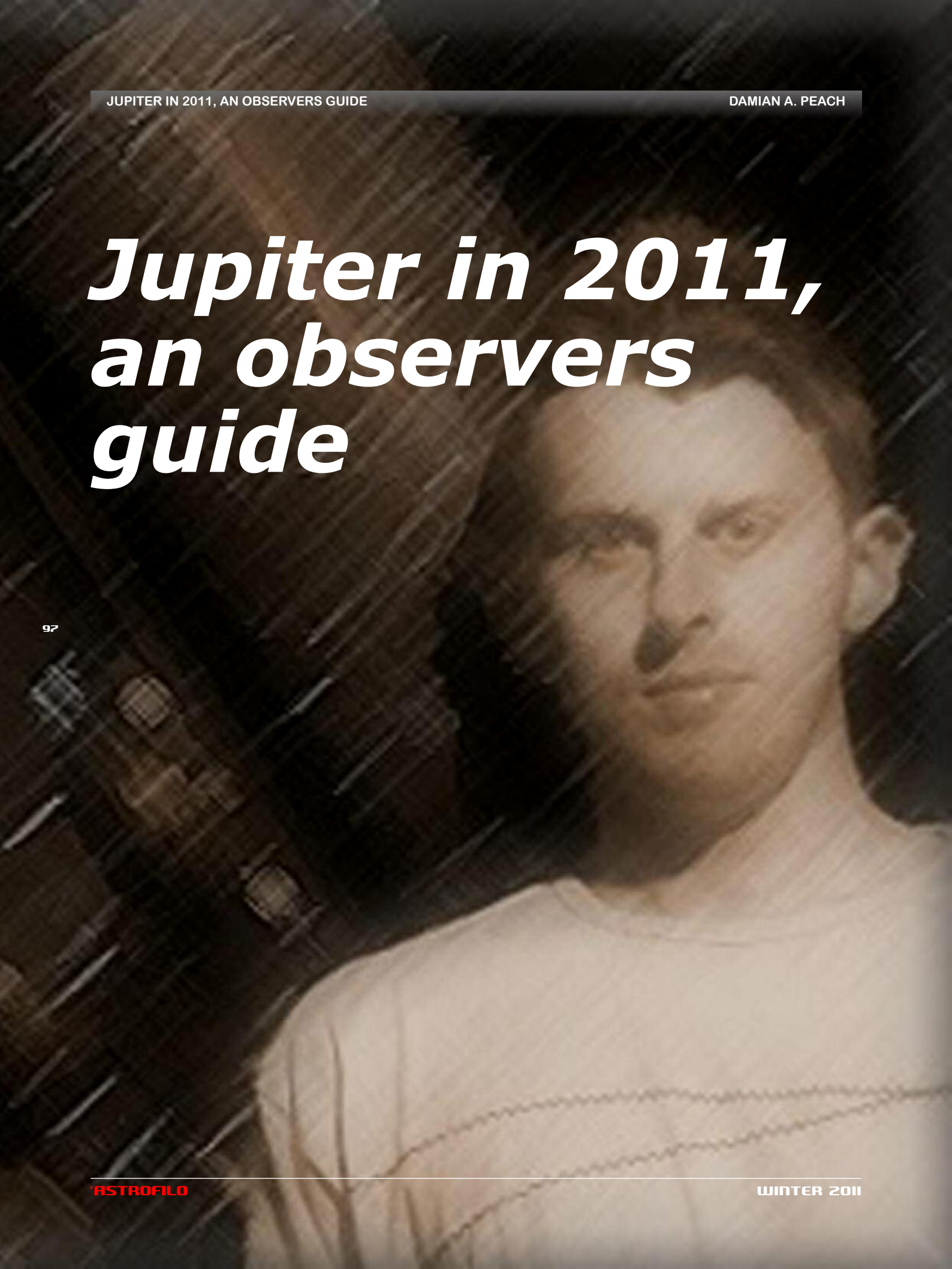
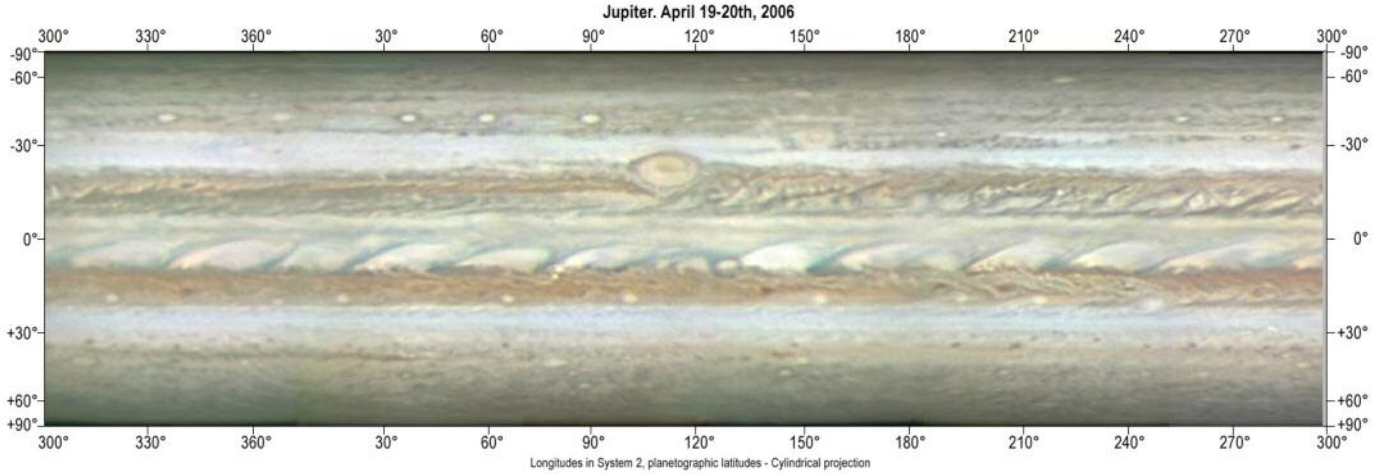
Jupiter in 2011, an observers guide



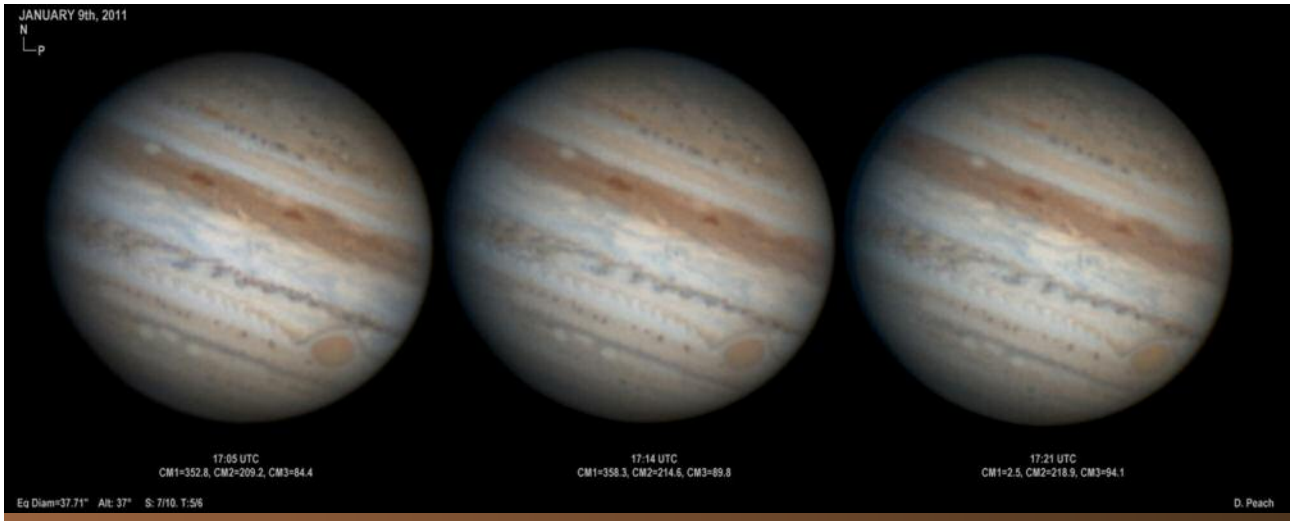
January 30th, 2011. Oval BA and the GRS are nicely presented. The SEB continues to revive.

This year sees Jupiter finally placed high in the sky for northern hemisphere observers. Damian Peach tells us what to look out for this coming opposition on the Solar System's most dynamic world.

Jupiter is a planet that can look detailed, dramatic and large in the telescope on almost any occasion but the coming opposition of October 29th, 2011 sees an especially grand show for observers with the ideal balance of large angular size, coupled with favourable late summer weather occurring for



Strip Map of the entire face of the Planet showing the typical appearance we see of the belts and zones. The North Equatorial Belt is almost always the most prominent belt on the Planet. D. Peach.



January 9th, 2011. Now far from opposition. The SEB revival is well underway with the GRS headed off the disk.

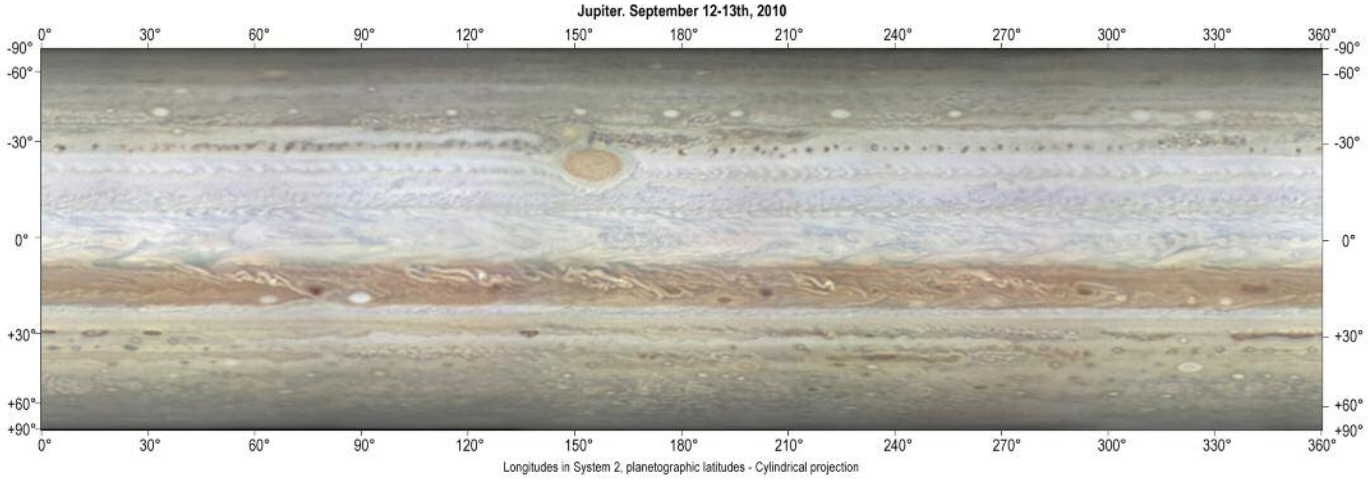
Northern hemisphere observers in the pre-opposition period. 2011 will see another close approach of the planet, though not quite as close as during last years perehelic opposition, though the planet will still attain an apparent diameter of almost 49.7" arc seconds at opposition in 2011.

Jupiter shines in the constellation of Aries throughout 2011 peaking at a brilliant mag –2.9 at opposition.

Its favourable northern declination will see the planet placed high in the sky for the first time in several years for far northern observers.

A World of Storms

Jupiter is by some margin the largest planet in the solar system, large enough to swallow more than 300 Earths within its massive volume. A world of endlessly churning storms, its dynamic and colourful atmosphere has long been marvelled at by observers

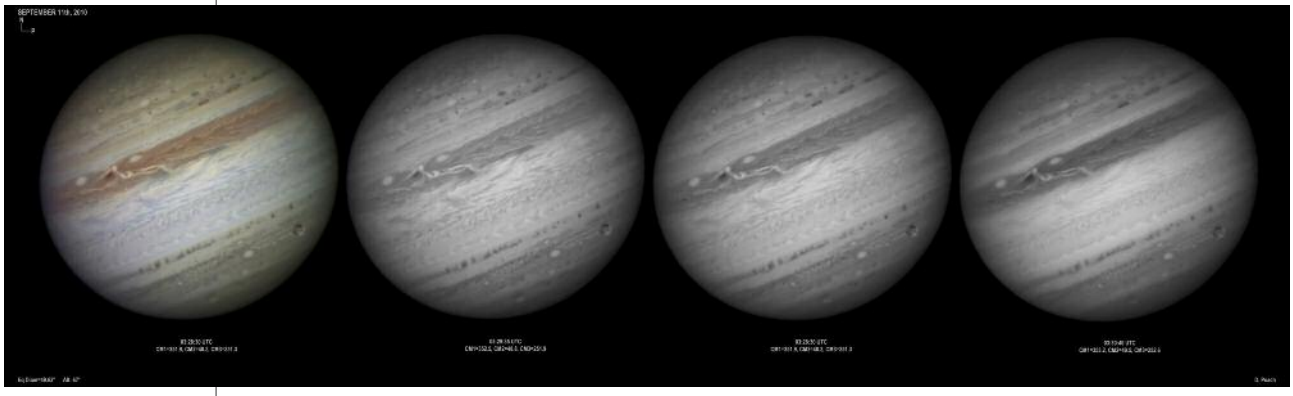


Jupiter 2010 - Cylindrical map of the entire Planet, Sep 12-13th, 2010.

(Right and bottom) September 11th, 2010. Only fair to good seeing as two solid days of poor weather cleared away. Ganymede nearby with spot Z prominent with a dramatic NEB rift nearby.

dating back to the famous spot seen by Cassini back in the late 1600s. Its four famous Moons (Io, Europa, Ganymede and Callisto) in their own right fascinating worlds, are prominently seen circling their master even in binoculars.

time of writing this feature has once again become a prominent orange colour. Other more dramatic events can occur such as fading and revival of the South Equatorial Belt such as occurred late in the 2010 apparition.



Jupiter itself is circled by bright zones and dark belts. The zones and belts contain many types of differing and ever changing meteorological features. The most prominent features are the North and South Equatorial Belts (NEB and SEB) but by far the most famous feature is of course the Great Red Spot (GRS) a massive storm twice the size of Earth, and at least 200yrs old.

Another prominent feature is a large storm known as "Oval BA". This formed from the merger of three large prominent white ovals between 1998 and 2000 and even became a smaller red spot of its own in 2006, and though its colour having faded for a time, at the

Visual Observing

For many years the proven and best way to record the Jovian atmosphere was by making visual drawings of what could be seen at the eyepiece. But what can the observer expect to see on Jupiter? The answer to this of course isn't a simple one, but in general a considerable amount can be seen on the planet and this opposition presents an especially fine opportunity for users of small telescopes.

A 15cm (6") reflector or 10cm (4") refractor will reveal all the major dark belts and bright zones, as well as features such as the Great Red Spot and wispy Festoons. If such apertures are

(On this page and following page) September 12th, 2010. Near perfect conditions on this night. A wealth of detail is visible across the Planet and nearby Moons Io and Ganymede. The GRS, Oval BA and the NNTZ LRS are all well presented. [D. Peach. 356mm Reflector. PGR Flea3]

of a high quality optically, far more than this can be seen, and on the very best nights such scopes may even begin to show so much detail as to make sketching it all difficult.

For those with larger telescopes in the 20cm + range Jupiter reveals a tremendous wealth of fine detail, and a good 20cm reflector or 15cm refractor will provide a lifetime of wonderfully detailed views.

It should of course be noted, that the highest quality optics the observer can obtain are highly desirable for any planetary observing or imaging projects.

I highly recommend the use of coloured filters for observing Jupiter. These can be easily obtained from many suppliers. For Jupiter the most useful filters for the visual observer are Red and Blue. Smaller scopes (less than 20cm aperture) may prefer Orange or Light Blue. Filters worth considering are Wratten #25 (Red), #21 (Orange), #38A (Dark Blue) and #80A (Light Blue.)

Digital Imaging

As well as being a fascinating target for the visual observer, Jupiter today is a prime target for modern technology. CCD cameras and webcams are providing us with views of Jupiter in such extraordinary detail, that the finest amateur imagery even approaches that taken by the world's largest mountain-top observatories. Such images in recent years have allowed detection of jestreams on Jupiter only previously recorded from spacecraft imagery and the following of the general meteorology of the Jovian atmosphere in unprecedented detail. Even small amateur telescopes equipped with a webcam can produce detailed imagery.

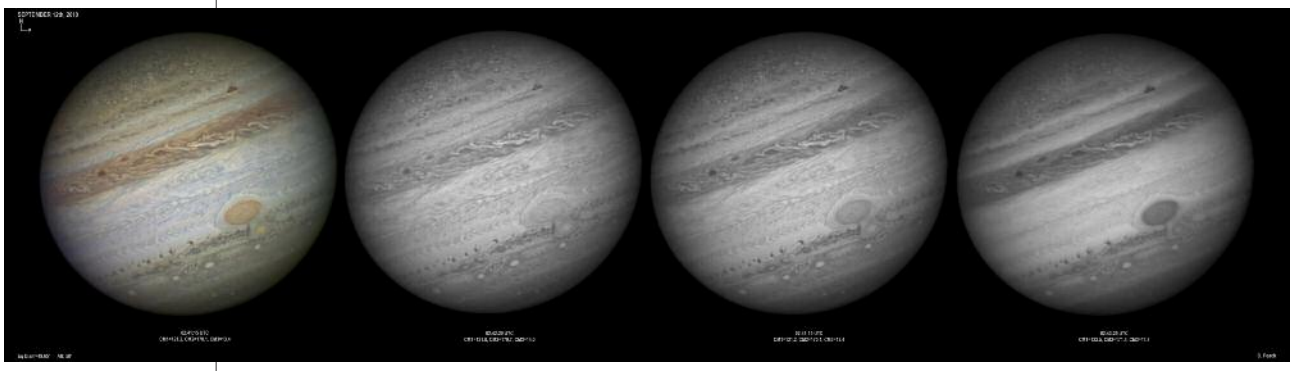
The best tool for imaging of the Giant planet today, is the affordable webcam. This allows real-time viewing of Jupiter on screen, and the imagery produced from high quality webcams currently stands as the best imagery of the planets ever produced by amateurs.

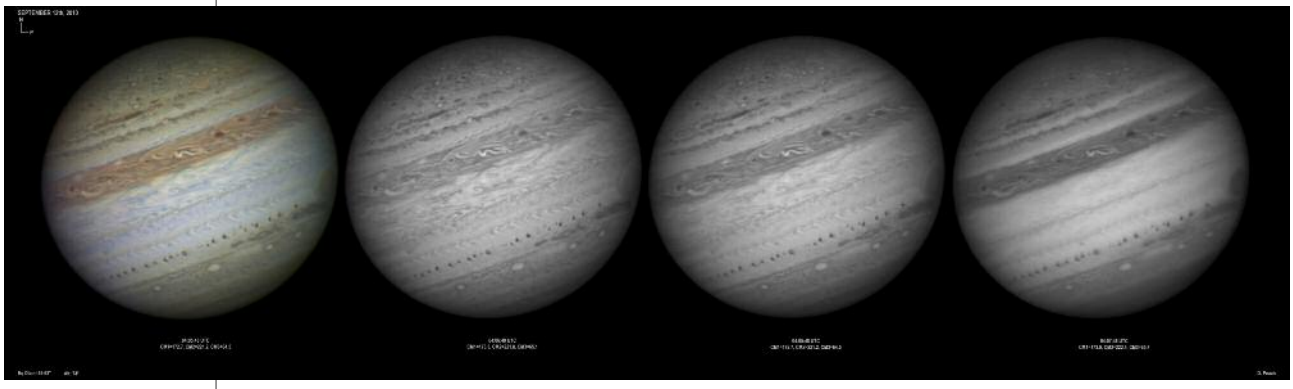
The most popular cameras in use today are the DMK and Lumenera series of high speed video CCD cameras, though excellent lower cost alternatives are available such as the Phillips Toucam and SPC900 which can be obtained second hand fairly easily for around £50 (or €70).

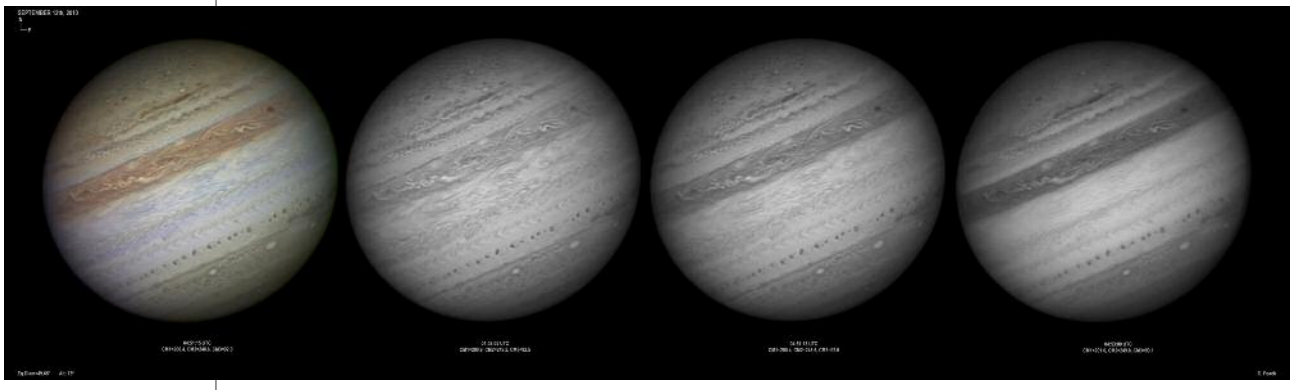
Using such cameras its possible to take detailed images fairly easily.

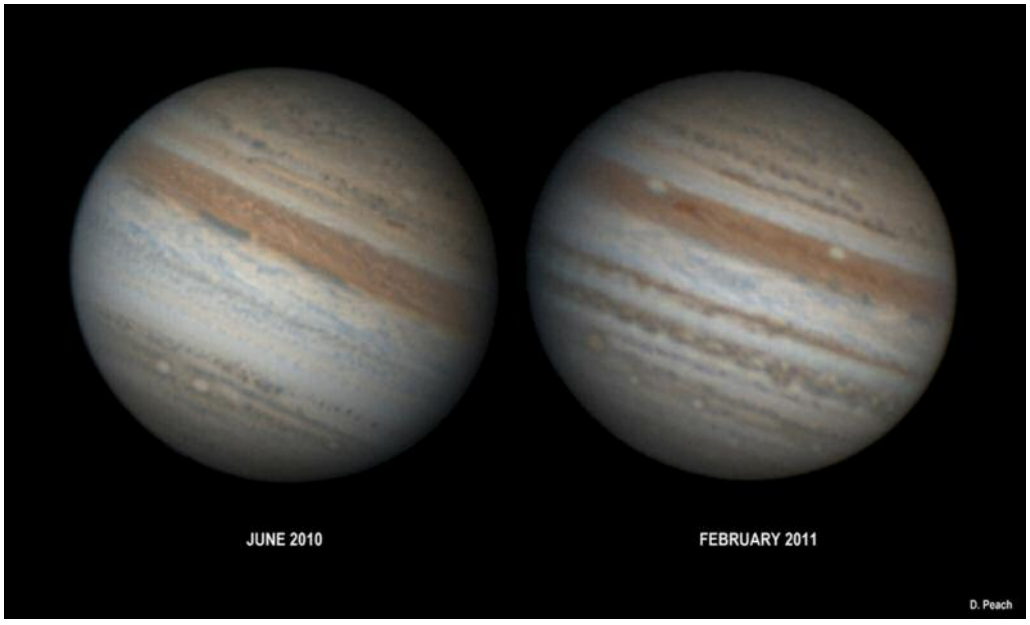
Either a full colour camera can be used to produce colour images, or one can use a mono camera and use different filters to bring out different details on the planet, very much in the same way as visual observers use filters.

The great thing with mono cameras is









Jupiter's SEB revives. Two views of the same hemisphere taken 4 months apart. The reviving SEB is clearly apparent. In 2011 we will see a much darker and turbulent SEB than during the previous apparition. D. Peach.

they allow the use of specialised filters such as IR and UV filters. IR filters are especially useful to help produce images in poorer seeing conditions or when the planet is lower in the sky.

Free software is widely available for processing the imagery obtained from webcams. Registax is probably the most popular piece of software and is available for free download online.

What to look out for in 2011

The 2010 apparition of Jupiter ended on a very interesting note, as the South Equatorial Belt (SEB) was well into its revival stage after being in a faded condition throughout 2010.

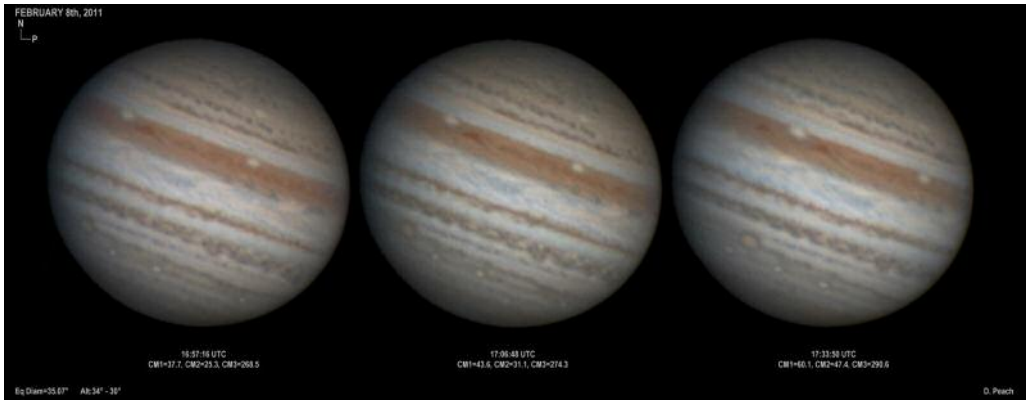
The revival of the SEB sees the faded SEB dramatically and often violently restored to prominence by the eruption of bright and dark material from a brilliant source region within the belt itself.

Dramatic dark and bright spots rapidly spread from the source region around the planet on the northern and southern jetstreams of the SEB and over the course of a few months restore the belt to a prominent darkened belt.

This activity was well observed late in 2010 into early 2011 as Jupiter moved

Ganymede on September 18th and 29th showing two opposite hemispheres. Note the clearly identifiable surface features such as the brilliant ray craters Osiris and Tros. D. Peach.

toward solar conjunction. The 2011 apparition will see the newly restored turbulent SEB again a dark and prominent belt. The North Equatorial Belt (NEB) remains very dark and well defined.
Through the telescope it is by far the most prominent feature on the Jovian disk. Of course the famous Great Red Spot is always on view though during late 2010 the colour had begun to fade slightly with the reviving SEB.



February 8th, 2011. Oval BA is nicely presented. The SEB continues to revive with much turbulent activity along its N and S edges.

Where to send your Images & Observations

Observers should consider sending their visual drawings and CCD images to the British Astronomical Association (BAA) and Association of Lunar & planetary Observers (ALPO) for analysis. Observers can find all the relevant information on these organisations activities on their web pages which can be found at the end of this article.
With each submitted observation or image one should include relevant information such as the accurate date and time of the observation, as well as other details such as the instrument and filters used.
The following organisations welcome submissions of Jupiter observations: British Astronomical Association (BAA) www.britastro.org/jupiter. Association of Lunar and Planetary Observers (ALPO) http://alpo-astronomy.org. Association of Lunar & Planetary Observers Japan http://alpo- j.asahikawa-med.ac.jp/Latest/index.html.

Conclusions

Jupiter is without doubt one of the most dramatic sights the night sky has to offer. Its ever-changing face is always a dramatic and colourful sight. The coming opposition of October 2011 sees Jupiter attain a great apparent size in the telescope, and observers using telescopes of all sizes have a real chance to enjoy the giant planet at its very best.

Damian A. Peach is an Assistant Director of the BAA Jupiter section and recipient of both the Merlin Medal and Walter Haas awards for his contributions to Astronomy over the last fifteen years. Internationally recognised for his spectacularly detailed photographs of the Planets, he has also authored/co-authored many articles, papers and book chapters as well as occasionally appearing on the BBCs Sky at Night TV program in the UK.