

How to shoot for Mars

Mars is ripe for astrophotographers to make the most of, capturing the hues and details of its rotating surface with a webcam, writes **Damian Peach**.

■ Red Mars once again shines bright this March. Image: Jamie Cooper.

Mars can be a challenging planet to observe. Its small angular diameter coupled with the glare of its brilliant disc can at first glance present a rather disappointing view, especially when compared to Jupiter or Saturn. However, with practice, a set of coloured filters and some patience, Mars can present a fascinating and engrossing target for visual and photographic observation.

Telescopes as small as 60mm aperture will reveal the dark Syrtis Major and brilliant polar cap. Larger apertures in the 100–200mm range will reveal considerable detail, such as small localised clouds and discrete surface markings, while large aperture telescopes can reveal a wealth of fine detail across the face of the planet even when months from opposition.

▼ A webcam attached to a 3× Barlow lens at the eyepiece can make Mars nice and big on your webcam chip. Image: Martin Mobberley.

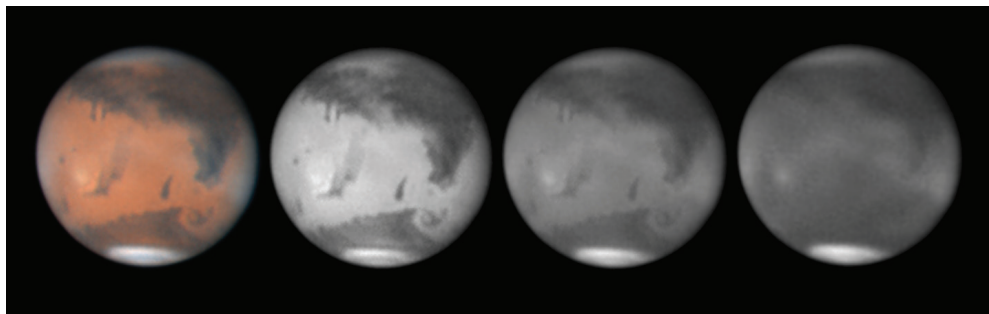
One very important tool for observing Mars, whether through the eyepiece or via camera, is a set of coloured filters. These are extremely useful to help contrast certain details far more clearly than a simple unfiltered view. The most useful filters for observing Mars are either a Wratten 23A or 25 (orange/red filters that greatly help contrast the dark surface markings) and a W80A or 38A (light blue/blue) that reveal the clouds and hazes that occur in the Martian atmosphere. You will often find that Mars' appearance through these filters is considerably better than the unfiltered view, especially when using the orange/red filters to help better see the dark surface markings. Mars tolerates high magnifications quite well so don't be afraid to bump up the power. Around 35× per inch (25mm) of aperture is recommended, and if the view is extremely steady and sharp perhaps more.

Try a webcam

While observing Mars in the eyepiece is great fun, some may want to try their hand at photographing the red planet. This can be accomplished using a digital SLR attached to a small telescope, getting good results is difficult and the easiest way to photograph Mars is by using a webcam connected to a laptop to capture video sequences.

Planetary imaging today is perhaps easier and cheaper than it has ever been, which is great news for those wanting to have a go at photographing Mars. You'll need a laptop, a webcam type video camera (such as Phillips ToUcam/SPC900) which plugs into the eyepiece holder of your





▲ Images of Mars taken through red, green and blue filters clearly illustrating how different filters emphasise different details. Note the bright clouds in the blue filter image at far right. Image: Damian Peach.

telescope and some software to process the video files (such as *Registax*.) More expensive cameras, setting you back upwards of £200, are available from other manufacturers such as The Imaging Source, Lumenera and Point Grey Research.

First you'll need to increase the focal length of your telescope to approximately $f/30$ to $f/50$ by using an amplifying lens such as a Barlow lens or Powermate. If the telescope is a reflector (Newtonian/Schmidt-Cassegrain Telescope) you'll need to ensure the collimation is good by examining a star at high power. Once this is done you can plug the camera into the eyepiece holder of the telescope, giving you a live video feed onto your laptop. If you are using a colour camera it's very important to make sure you use an infrared blocking filter in front of the camera otherwise the colours will be skewed because of the high infrared sensitivity of most CCD chips. Carefully focus the image as best you can and adjust the exposure/gain settings so the planet's disc is not overexposed.

Luckily, Mars spins quite slowly so you have a reasonable amount of time in which to capture sequences before planetary rotation starts to blur detail. Three to four minutes is perfectly fine for capturing a single sequence. Once you've captured several sequences, you'll then need to take these into some processing software designed to handle these video files. Excellent freeware programs such as *Registax* and *Autostakkert* take all of the frames that have been captured and average the best ones into a final raw image, a process that helps to smooth out the grainy noise that would otherwise swamp real detail.

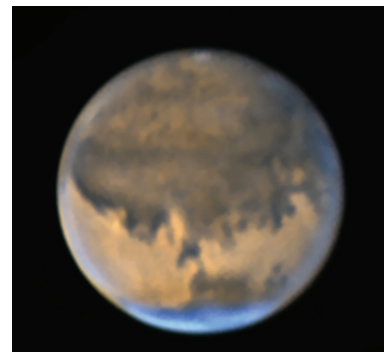
As with visual observing, colour filters are extremely useful, especially for those equipped with monochromatic cameras. Indeed, using red, green and blue colour filters will be the only way to obtain a colour image of the planet. Shooting Mars this way is great as it provides more specific information on the surface and atmosphere of the planet and the blue filtered images are especially useful to watch

the development of the Martian clouds. Many clever techniques can be employed when constructing a colour image from filtered light sequences. However I strongly recommend sticking to straight RGB imaging rather than using red or infrared images as luminance data to bring out the dark surface markings more clearly in colour images. This completely skews the colour and tones of the planet and destroys the clarity of the delicate atmospheric features in the colour image, not to mention often turning the planet a bright pink colour!

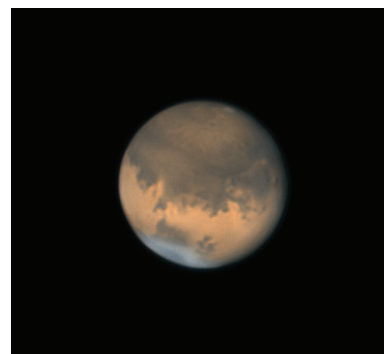
Contribute your work

There are several organisations that observers can contribute their work too. The British Astronomical Association's Mars section is very active and has a long history of publishing reports on the planet. Other organisations such as the Japanese-based International Society of Mars Observers (ISMO) also runs a very active programme each apparition and publishes a monthly bulletin summarising the observations received and activity observed.

Whether you simply observe or take detailed images of the planet, one cannot fail to be captivated by it as so many have in years gone by. The observational history of Mars is a rich and dramatic one going back to times



▲ An RGB image of Mars taken on 18 November 2005 through a Celestron-14 at $f/44$ with a Lumenera LU075M camera. Image: Martin Mobberley.

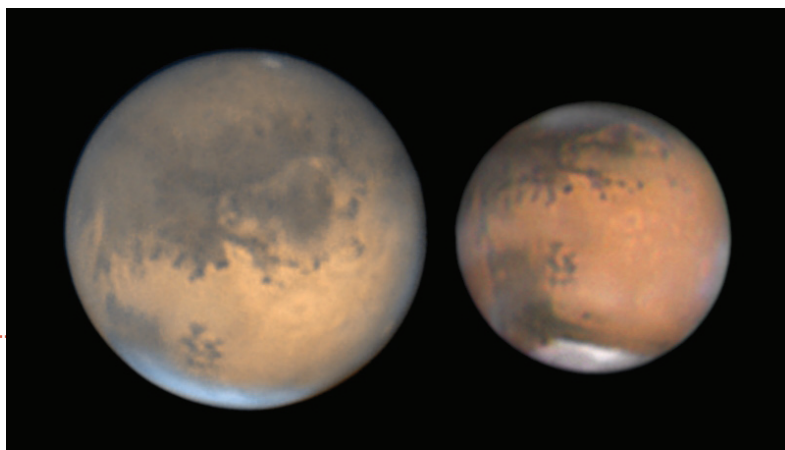


▲ Mars, imaged on 17 November 2005. Image: Jamie Cooper.

when we had no idea if there were indeed eyes staring enviously back and plotting against us! Today Mars appears to be a dead world of nothing more than dust, ice and rocks; however it remains a captivating place not only to amateurs but professional scientists such as those at NASA who continue to explore this fascinating world with probes and rovers. Luckily for us we can also continue to explore Mars from our own back gardens and this coming spring presents an ideal chance to get to know the Solar System's next best thing to Earth.

Damian Peach is a world-renowned astrophotographer.

▼ The distance of Mars from Earth varies considerably from one opposition to another as illustrated in these images comparing the oppositions of 2005 (left) and 2010 (right) Image: Damian Peach.



FIND OUT MORE

BAA Mars Section:

www.britastro.org/mars/

ISMO Mars Organisation:

www.mars.dti.ne.jp/~cmo/ISMO.html

Jeff Beish's Mars pages:

www.alpo-astronomy.org/jbeish/Observing_Mars.html

Damian Peach's Mars pages:

www.damianpeach.com/marsindex.htm