

The iOptron CUBE, A Versatile Astrophotography Tool!

An Aussie Keeps Astrophotography Simple Down Under

By Jeanette Dunphy

Since I first put my eye to the lens of my telescope, I've logged what I've observed. But reading back through my log books, I could never get back that feeling of how it felt to actually look at the object. What I really wanted was a visual log book. One I could look back on at a later date and say yes, that is exactly how it was that night.

I also wanted it to be a record of my journey through the learning curve of astronomy as well as astrophotography. It's very satisfying to look back at images you took only weeks before, compare them to what you took last night, and see how much you've improved your techniques in such a short time.

I know that what I produce is not at all like the pretty pictures you find on the back pages of the astronomy magazines,

but I'm not doing it for anyone else's pleasure but my own. And, I'm very happy with what I've achieved with the equipment that I have.

I've been dabbling with astrophotography for a couple of years now. Starting with the simple afocal method, butting the lens of my Canon S3IS up to the eyepiece of my 10-inch Dobsonian to capture what I feel are some quite good images of the moon. Most amazing was what I managed to pull out of my elderly Panasonic DV camera. Shaky AVI files transformed (with the help of *RegiStax*) into detailed images of Jupiter, revealing shadow transits of the Great Red Spot (GRS). It was all good fun and I even managed to get a series of GRS shadow transit images published in one of the Australian astronomy magazines.



But I wasn't just observing Solar System objects. Inevitably, I had to find a way to start imaging DSOs. Seeing how most of my experience to that point had been with video astronomy, I put my research to that end and found out about imaging with an Integrating Video Camera (IVC).

I ultimately decided on an Australian product, the GStar-EX. As are most IVCs that are optimized for astro imaging, this camera is extremely sensitive and capable of internally stacking images to produce a single frame that contains a lot of data. Even though the longest exposure of which the GStar-EX is capable is only 2.56 seconds, what it can capture is extraordinary.

While I knew that I didn't have the ideal scope for imaging Deep Space Objects (DSOs), I didn't let that stop me

IMAGING WITH THE IOPTRON CUBE



The iOptron Cube is shown with a Canon 20d mounted on the dovetail plate. The mount's accurate tracking permits exposures of up to 60 seconds before field rotation seriously diminishes the results.

from having a go. By keeping the integration rate of the camera down to 32x, or one frame every 0.64 seconds, I managed to keep star trailing down to a minimum. With much patience I managed to capture some good detail within the Tarantula, Lagoon and the Orion Nebulas. Not being able to fit the entire object within the field of view was a trial. I learned a lot about creating mosaics during this time.

My next step was to combine the IVC with a 16-100 mm CCTV lens simply mounted stationarily on a standard camera tripod. By doing this, I widened the image field of view and made it possible to utilize the camera at its full sensitivity without star trails. This camera-lens combination made for great live viewing and I have the fondest memories of zooming in on Comet Holmes, observing as well as recording AVIs as night after night it swelled in size. During the Taurid Meteor shower, a meteor grazed the edge of the comet (amazing viewing) and the few frames I captured of the event turned into

a great little animated GIF file. The first time I visually observed the Flame and Horsehead Nebulas on the monitor in real time was amazing too.

But still I was limited to the number of frames I could capture before the target object drifted from the field of view. As I really wanted to use this incredibly sensitive little camera to its full potential, I needed some sort of tracking. I'd been reading about the new iOptron Cube in the astro mags for a while and, after a bit of research on the net, I thought that it may just be what I was looking for. Best of all, the price was right, keeping me under my self-imposed \$500 budget limit. I ended up buying the basic iOptron Cube/80-mm (f/5) refractor combination as well as a 5000 object go-to data base from Sirius Optics here in Queensland, Australia.

Setting up the Cube is pretty straight forward. To get accurate tracking and go-tos it is very important to: (1) make sure the location coordinates that you input

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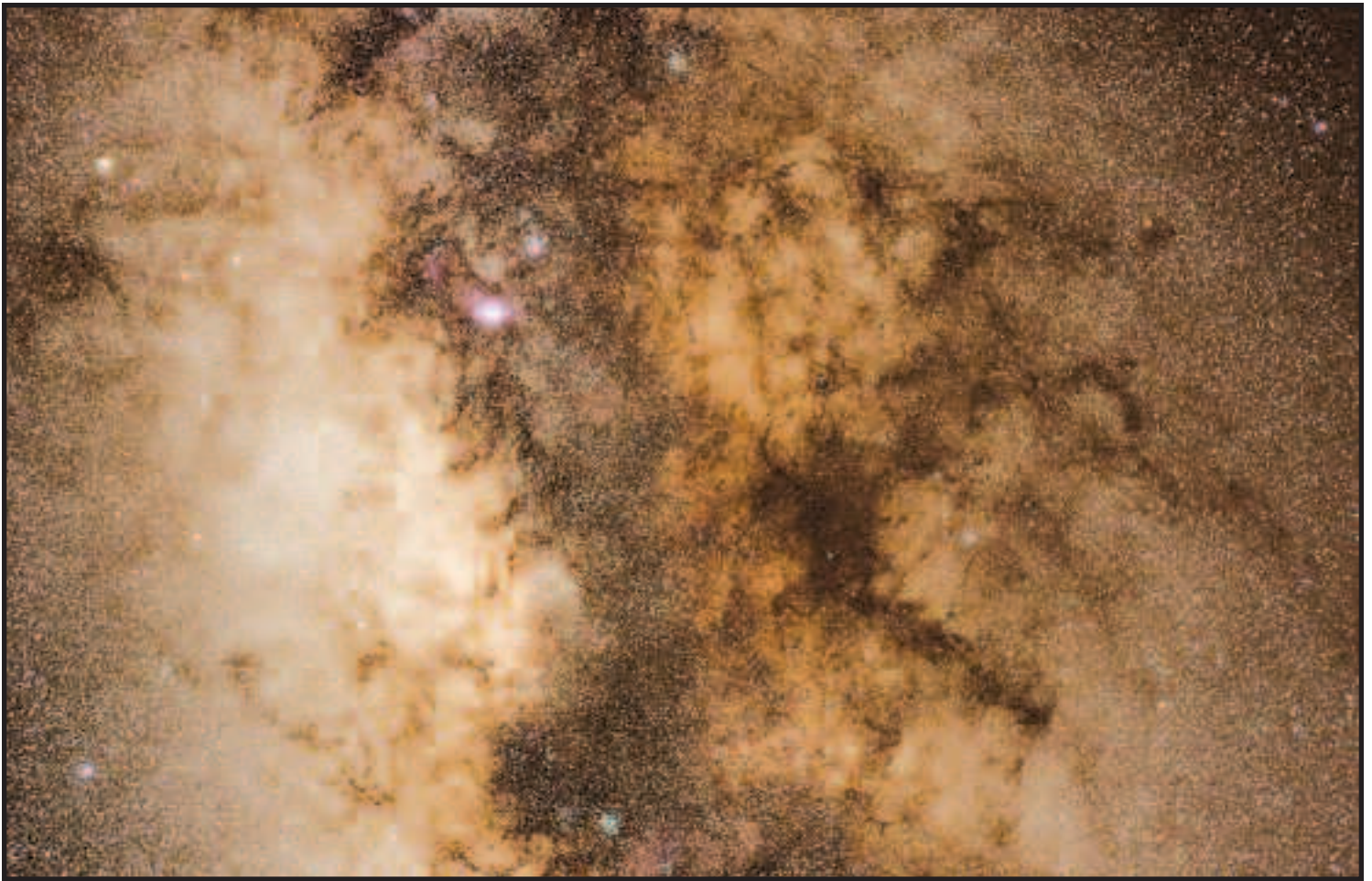
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This image of the Sagittarius field was comprised of four 60-second exposures captured with a Canon 20d mounted on the iOptron Cube.

are correct, (2) make sure the mount is level (I bought two levels and use them both at the same time rather than rely only on the included round bubble level), (3) recheck levels to insure that the scope is level when in the “park” position after it is installed on the mount, (4) use a reliable compass when orienting the mount to “south” (Or north for many of you.

Don't forget that you will need to offset a certain number of degrees specific to your location.), and (5) once you do your one or two star alignment, perform a few “Sync to Target” routines to fine tune the go-to alignment.

Initially, I used the iOptron 80-mm refractor as is, straight out of the box, with some success, but soon made a few mod-

ifications to suit my specific needs. First, I exchanged the smaller finder that came with the scope for the 50-mm right-angle finder scope from my Dob. Later, I replaced the rack and pinion focuser of the 80-mm refractor with a 10:1 Crayford style focuser that allows me to make much finer focus adjustments.

The subsequent purchase of an extra



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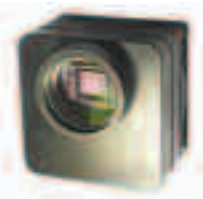
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IMAGING WITH THE IOPTRON CUBE

dovetail plate allowed me to use the iOptron Cube for astrophotography three different ways: (1) with the IVC at the prime focus of the 80-mm refractor; (2) with the IVC mounted directly to the Cube using a variety of CCTV and Canon SLR lenses for wide-field photography, and (3) with my Canon 20d DSLR mounted directly on the Cube to capture up to 60-second exposures using Canon's "Nifty 50" f/1.8 lens.

Using the 80-mm f/5 refractor with the IVC at prime focus, M42 fills the frame. When a 0.63 focal reducer is added to the assembly, the field of view increases accordingly and The Running Man is also included. I've not used a Barlow with this setup because the extra weight unbalances the scope, but this can be fixed by fitting a longer dovetail bar to the scope. I simply haven't gotten around to doing this as yet.

As the IVC is very sensitive to infrared, an IR cut filter is essential. I capture AVIs using the GStar capture program that is a free download from

www.myastrorshop.com. It makes capturing video so simple. Just select your integration rate, the number of frames you want to capture, and click a button to start. Then put the dust cap on the scope and capture your darks.

Using the Point and Zoom tool within the program makes focusing the camera very easy as well. Any adjustments come up on screen within a couple of seconds. The next stage is processing the video. I open the AVI in *VirtualDub*, and cut any segments of the file that may have inadvertently been ruined by meteor trails, aircraft lights, or star smears from when the scope was bumped (by the dog, cat or me). I then save the image sequence to file ready for stacking.

Deep Sky Stacker is used for stacking and *Paint Shop Pro* and *PhotoShop* for post processing. My IVC can be used with a wide range of 1/2-inch c-mount or cs-mount lenses. Though you can get away with 1/3-inch lenses, you will get some vignetting around the edges. You can spend

as little as \$15 on a fixed focal length lens or, for around \$45-\$65, you can pick up a nice vari-focal lens. For recording meteor showers, a 2-mm lens should cover enough sky to pick up most meteors.

Using a C-Mount-EOS adaptor from Mogg Adaptors, I can use all of the lenses that fit my Canon 20d. I find my 70-300 mm Sigma lens perfect for Astro Outreach nights, exploring the Milky Way in wide field, and then zooming in on specific objects of interest.

I recently managed to pick up a second-hand Canon 20d for a very reasonable price, so naturally I just had to see how well it would perform on the iOptron mount. The best results so far have been obtained using the Canon 50-mm f/1.8 lens. I've pushed exposures up to 60 seconds before field rotation became too obvious. If you are careful with framing your image, you can go a little longer and crop the rotation from the final image.

My biggest issue so far has been coma from the lens itself. From the short time I've been using the Canon 20d, I've learned to take as many images as I can – the more the better. The more you can stack, the better the final image. Capture in RAW mode and use the DSLR's mirror lockup function to prevent any vibrations. I also recommend using the in-camera dark-frame subtraction method. I know it's a pain to wait the extra time, but it's less boring than having to take the required darks at the end of the imaging session.

I've really enjoyed using my current set up. In fact, I've only used my 10-inch Dob a couple of times since I've bought the iOptron mount. The views I get live on my computer monitor through the 80-mm refractor and the IVC are, in fact, far better than what I can see visually through the Dob. Why squint through an eyepiece when you can sit back in a comfy chair and observe real time with an image scale that is very easy on the eyes?

To me it's the perfect grab and go unit. It's just so simple to use. I took the

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iOptron mount and scope to Queensland Astrofest this year, leaving my big scope behind, saving my back and giving me much needed additional car space. The little scope's reception on the field was mixed. I'm sure some felt that my "toy" telescope had no right to be sharing the same field with their "real" scopes (no doubt the "Astroboy" sticker I'd put on the front of the mount may not have

helped dispel such impressions). But, there were those who were curious to see just how well this little blue Cube could perform. I'm pleased to report that all who took the time to stop and see the iOptron in action were suitably impressed.

And at the Barambah Dark Sky Camp it was the only scope and camera on the imaging field that was reliably

working and imaging for the entire time. Before the event ended, every other set up (some worth many thousands of dollars) had stopped working due to various hardware and software problems. It was very difficult not to show how smug I felt about that.

There is a lot to be said about keeping it all simple and the iOptron alt-azimuth go-to mount and scope simply work. 

Images from the author's 'visual log book' captured with an Integrating Video Camera mounted on the iOptron Cube and 80-mm f/5 refractor.

Image 4: "The Keyhole" Image 5: "Large Magellanic Cloud"

Image 6: "Orion Nebula" Image 7: "The Hamburger"

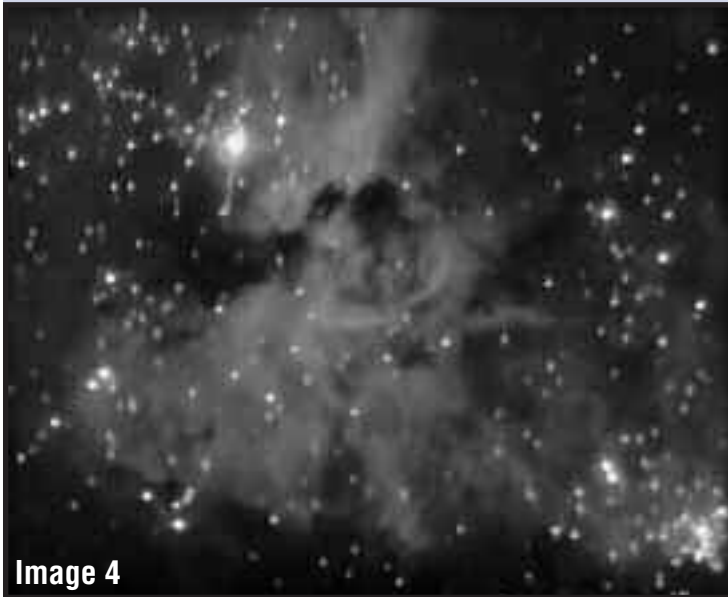


Image 4

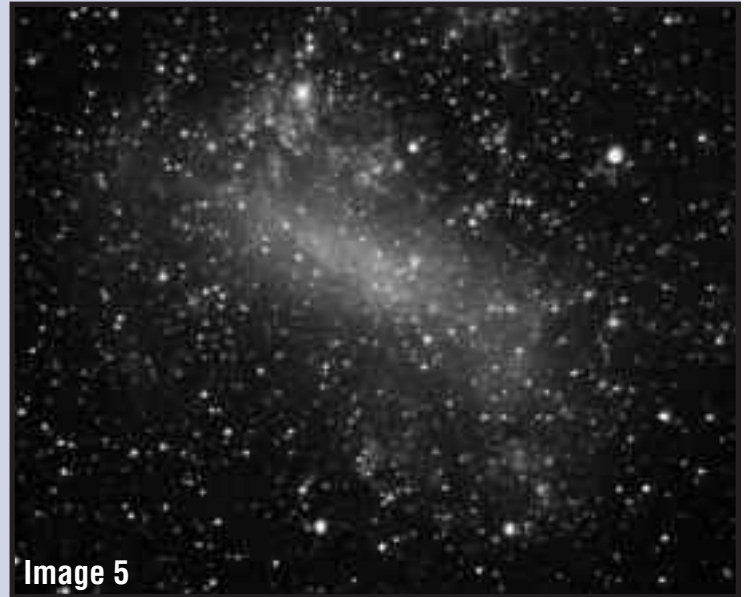


Image 5



Image 6



Image 7