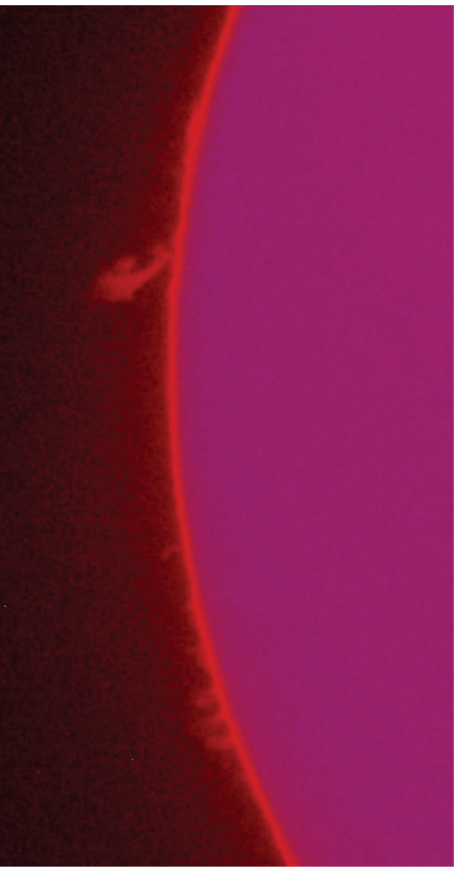
Daystar's **new views of the Sun**

On the odd days this summer when it didn't rain, **Steve Ringwood** discarded his umbrella to ogle at that rarest of sights – the Sun – through Daystar's new SolaREDi 80mm hydrogen-alpha telescope.



▲ The author's DSLR photography of prominences on the solar limb, giving an indication of the view through the SolaREDi. Note the bumpy limb and 'hairy' spicules.

▼ The SolaREDi points its lens sky-wards, waiting for the clouds to part.

The Sun's unpredictability and wealth of detail at all scales – even in 'white light' – has always drawn me. In decades of solar observation on my various instruments, I have progressed from projection to full aperture mylar film and Thousand Oaks glass filters, but never really had the opportunity of full-on observations with a narrow waveband hydrogen-alpha solar telescope. A hydrogen-alpha telescope permits visibility of the otherwise invisible dynamic shell of energetic gas (the chromosphere) just a few hundred miles above the Sun's photosphere. So, given the opportunity of reviewing Daystar's new 80mm hydrogen-alpha telescope from SCS Astro, I leapt at it with gusto.

In the box

This kit comes in a robust pelican-style wheeled travel case that makes it seemingly tough enough to enter the solar atmosphere as well as observe it. Embedded within are the solar-scope, 1.25-inch diagonal, 0.5x focal reducer, 20mm Plössl eyepiece, solar finderscope and power supply. In addition to the Daystar ION solar filter, the OTA sports a calibrated two-inch dual speed focuser, 1.25–2 inch adapter plus felt-lined mounting rings with a Vixen-style dovetail bar. In a black livery, the OTA looks very smart with the ION filter a striking red at the business end.

The boast is that it is ready to use straight out of the box and, despite being a fairly novice user of hydrogen-alpha telescopes, I found this to be the case. The tube comes ready for action and only requires the finder to be fitted. Re-erecting an ancient Charles Frank German equatorial in a Sun-advantaged position of the garden, I soon had the felt-lined mounting rings mated to my mount and I was ready to go.

Receipt of the review telescope initiated the wettest weather the UK has seen for years. Yes, that continuous early summer deluge was entirely my fault. Three weeks passed before the clouds parted sufficiently to grant me first light. I initially used the lower magnification configuration; deploying the 0.5× focal reducer to contract the 2,280mm focal length of the telescope to one of f/14 at 1,140mm. With the supplied 20mm Plössl eyepiece this yields a magnification of 57×.

The wide field 30mm solar finder itself gives a safe yellow image of the Sun and shows main sunspots easily. Against a 'black' sky, targeting the Sun with the finder's steely cross-wires is easy.

Connecting the ION filter to its 12V DC (120–240V AC adapter) power supply, I wait only a couple or three minutes for the unit's indicator light to change from yellow to green – indicating that it had reached its operational condition and was ready for use.

The 20mm provides a field of just over half a degree, comfortably capturing the whole disc. As my daylight-adapted eyes adjusted to the reddened circle before me, incredible detail began to emerge.

The view

The first features to literally leap out were several large prominences sprouting from the limb. One was a fine sweeping loop, showing clear dark space between its arch and the solar limb. The Sun boasted several sunspots but these looked nothing like their white light counterpart. Devoid of penumbra, each seemed the centre of a dark tangled knot, resembling a squashed spider. Granulation

■ The ION solar filter up close, with its 12V power input, ready light and wavelength tuner.

◀ The SolaREDi's rugged carry case, containing the telescope, diagonal, focal reducer, Plössl, finderscope and power supply.

▶ A closer look at the ION filter (the black/red striped device), the Plössl and accompanying diagonal.

was not the subtle flecking seen in white light, but bold heavy mottling.

I then began to notice something I had never seen before. Around the limb of the Sun I could see tiny radial hair-like structures. These faint fibrous strands were spicules. Sprouting from the entire circumference, these supersonic needle-thin jets of gas were giving the Sun a seven day hairy beard! Clearly, the fine optics of this 80mm telescope were delivering exquisite detail.

Encouraged to proceed further, I removed the 0.5× focal reducer to increase the magnification to 114×. Although I was no longer encompassing the whole disc, further detail could now be seen in the prominences, like frozen veils of drifting red smoke. I could now see that a number of the large prominences were not actually joined to the solar limb, but dancing above it like shredded clouds. Far outnumbering their larger cousins, the fibre-like 'hairy' spicules were also clearer, but there was also something about the limb.

I swapped out the diagonal and the 20mm for the slightly higher power of a 13mm eyepiece (175×). The 'oddness' about the limb was now revealed to be a bobbled, bumpy texture, like seeing the edge of a thick-piled carpet. Here, granted visibility by the ION filter and the telescope's fine performance, I was seeing edge-on the hilly profile of activity very close to the 'surface', studded by fading and incipient dwarf prominences. Wonderful.

All the denizens of solar chromospheric life were here. Prominences, spicules, the bright pools of plages and the filaments of solar-profiled prominences. One filament I observed snaked across fully half the solar disc! Indeed, the solar surface resembled the venous view of a bloodshot eyeball. The filter itself features a fine tuning facility permitting a wavelength shift range of 1Å – and it was fascinating to see detail change subtly when I did so.

Focusing was especially critical at higher magnification, but the Crayford-style focuser and one-tenth adjustment was more than obliging. In the accompanying instructions, Daystar themselves do not encourage higher magnifications, at the understandable risk of degrading resolution. Nevertheless I was able to use powers close to 200× quite usefully.

During my enjoyable custody of the telescope, I also tried my hand at DSLR photography. A novice at 'chromospheric' photography, I was quite pleased with my success. Within a short time I was able to capture some very pleasing images of the surface and large prominences; at least, for a beginner.

Observing in what necessarily involves a bright sunlit environment, placing a dazzled eye in the right place for observation of a relatively low-intensity eyepiece field is more difficult than at night-time. Eyepiecesthat I own, along with a very generous eye-shield (that the Daystar Plössl lacked), were definitely more useful and helped appreciation of the image contrast and reduced ambient glare perceptively. The supplied eyepiece really should sport one. I also realised quite quickly that a tube shade, shielding the observer from direct sunlight, would also be beneficial. A few frantic moments with a piece of cardboard and a pair of scissors soon set that right. My impromptu Sun-shield made a big difference to observing comfort.

Quite apart from the superb telescope itself, I was also very impressed by the retailer/manufacturer support from SCS Astro and Daystar following a minor problem with a loose adapter plate screw. Great after-sales support is like gold dust and it certainly was not lacking here.

Despite its sophistication, this telescope is simple to deploy and use. A comparatively large aperture as far as most hydrogen-alpha solar telescopes go, it supplies a vast amount of detail that will fill the buckets of any solar observer. I will certainly regret returning it.

Steve Ringwood is Astronomy Now's *Equipment Consultant.*

▶ Daystar's SolaREDi 80mm hydrogen-alpha telescope. All images: Steve Ringwood.

At a glance

Aperture:	80mm
Focal length:	2,250mm (via an integral Barlow component)
Focal ratio:	f/28.5 (f/14.25 with focal reducer)
Hα filter:	1Å range centred on 6562.8Å
Supplied optics:	20mm Plössl, 0.5× focal reducer, dual speed to one-tenth Crayford focuser.
	The SolaREDi comes in five flavours of bandpass,
	0.7Å £3,000 (reviewed item)
	0.6Å £4,000
	0.5Å £5,000
	0.4Å £6,300
	0.3Å £7,700
Manufacturer:	www.daystarfilters.com