Admire the 'scary face' of the Sun through ultra-modern astronomical equipment

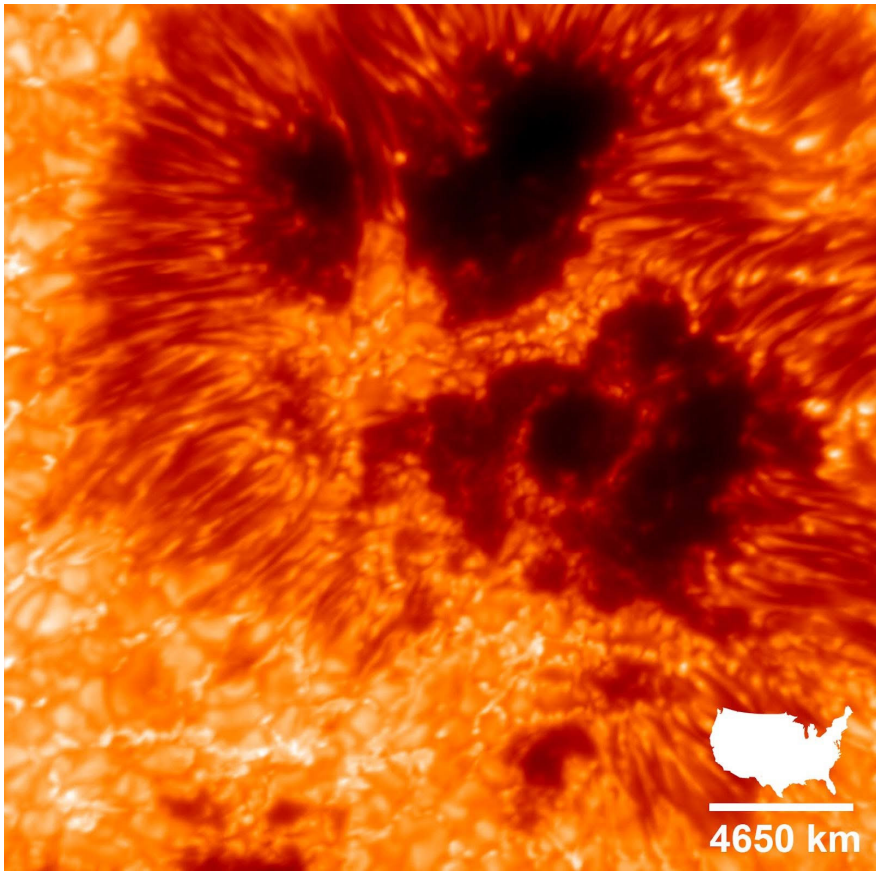
The Sun – the source of life on Earth – can also be extremely scary.

The Sun – the source of life on Earth – can also be downright terrifying. The first image taken with the newly installed Visible Tunable Filter (VTF) system at the Daniel K. Inouye Solar Telescope has revealed the Sun's surface in unprecedented detail, revealing sunspots that look like scenes from a horror movie.

VTF's breakthrough technology
VTF is an imaging spectro-polarimeter that takes images of the Sun at specific wavelengths. Unlike conventional cameras (which record multiple wavelengths at once), VTF precisely adjusts each wavelength to within a billionth of a meter, then combines hundreds of images taken in seconds to create a 3D image of the Sun's surface.

This image is the result of the VTF's testing process - before it officially goes into operation in 2025. Dr. Stacey Sueoka from the US National Solar Observatory (NSO), a member of the research team, shared:

> When I saw the first spectral steps, I was thrilled. This is something no other instrument on this telescope has been able to do. This achievement was the result of months of optical alignment, testing, and teamwork. Even with just one etalon filter installed, the potential of the VTF was already clear. This is just the beginning!



Featured in the image is a cluster of annotated sunspots roughly the size of the United States. These sunspots are associated with solar activity, often resulting in solar flares or coronal mass ejections (CMEs) – powerful bursts of plasma that can directly impact Earth.

When plasma from the Sun interacts with Earth's atmosphere (a phenomenon called "space weather"), it creates brilliant auroras but also causes radio interference, damaging satellites and power grids.

Instruments like the VTF help scientists gain a deeper understanding of solar activity and the mechanisms that cause space weather, thereby improving the ability to predict events that could threaten global technological infrastructure.

The image is not only a technical achievement, but also opens a new chapter in the quest to decipher the mysteries of our nearest star.