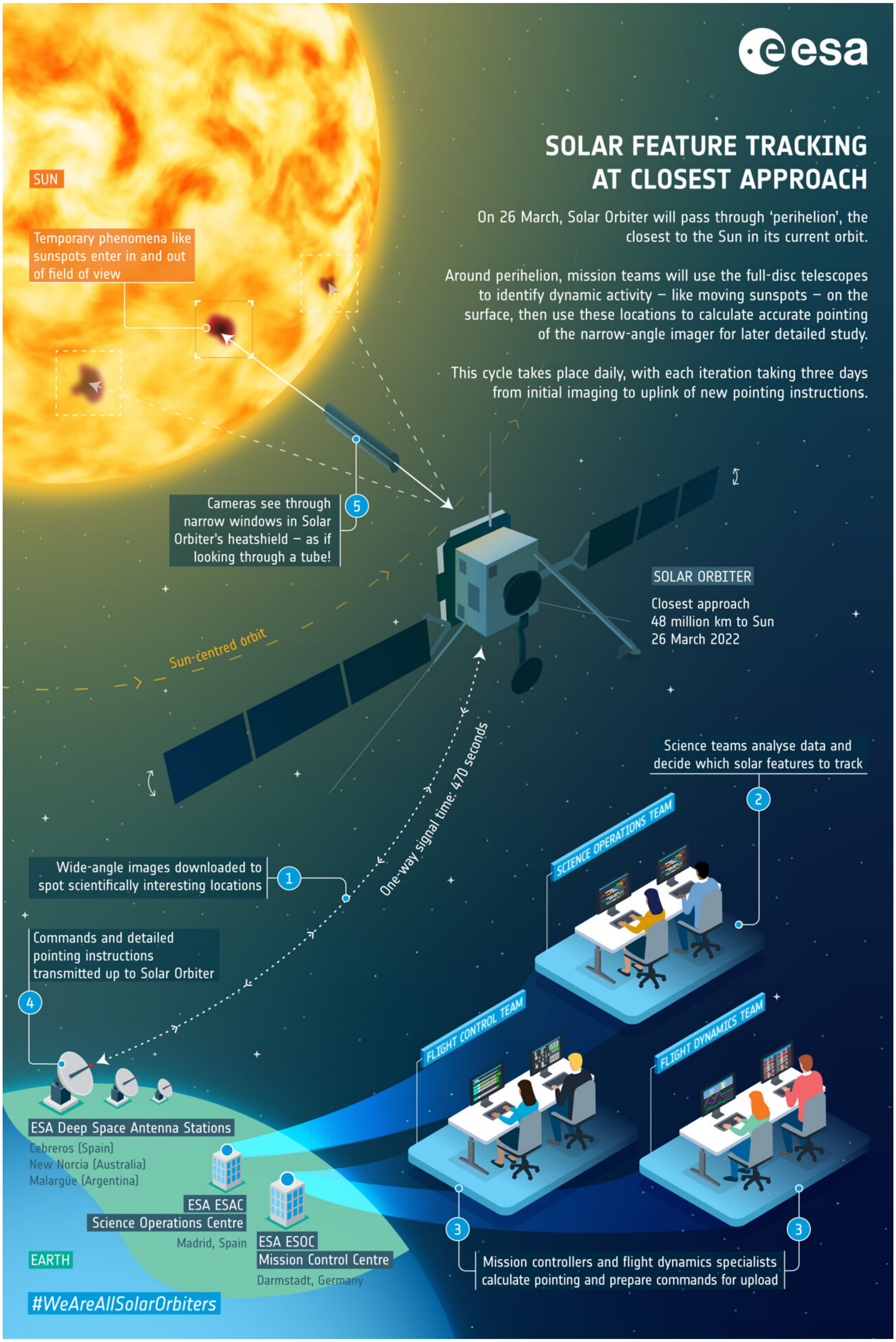
Tracking sunspots up close

March 25 2022


esa
SOLAR FEATURE TRACKING AT CLOSEST APPROACH
On 26 March, Solar Orbiter will pass through 'perihelion', the closest to the Sun in its current orbit.
Around perihelion, mission teams will use the full-disc telescopes to identify dynamic activity – like moving sunspots – on the surface, then use these locations to calculate accurate pointing of the narrow-angle imager for later detailed study.
This cycle takes place daily, with each iteration taking three days from initial imaging to uplink of new pointing instructions.
SUN
Temporary phenomena like sunspots enter in and out of field of view
Cameras see through narrow windows in Solar Orbiter's heatshield – as if looking through a tube!
Sun-centred orbit
SOLAR ORBITER
Closest approach
48 million km to Sun
26 March 2022
One-way signal time: 470 seconds
Science teams analyse data and decide which solar features to track
SCIENCE OPERATIONS TEAM
Wide-angle images downloaded to spot scientifically interesting locations
Commands and detailed pointing instructions transmitted up to Solar Orbiter
FLIGHT CONTROL TEAM
FLIGHT DYNAMICS TEAM
ESA Deep Space Antenna Stations
Cebreros (Spain)
New Norcia (Australia)
Malargüe (Argentina)
ESA ESAC
Science Operations Centre
Madrid, Spain
ESA ESOC
Mission Control Centre
Darmstadt, Germany
EARTH
Mission controllers and flight dynamics specialists calculate pointing and prepare commands for upload
#WeAreAllSolarOrbiters

Credit: European Space Agency

The ESA/NASA Solar Orbiter spacecraft is speeding towards its historic first close pass of the sun, which happens midday on 26 March 2022.

In the days leading up to and around perihelion passage, teams at ESA have been working intensively on an observation campaign, and all ten instruments will be operating simultaneously to gather as much data as possible.

This effort will include using its remote sensing instruments, like the Extreme Ultraviolet Imager to image the sun, as well as in-situ instruments to measure the solar wind as it flows past the spacecraft.

Observing specific targets of scientific interest on the sun requires close coordination between flight control teams and the flight dynamics experts at ESA's ESOC mission control center, in Germany, and teams at the science operations center at ESAC, in Spain.

ESA teams are using the full-disk telescopes on board Solar Orbiter to identify dynamic activity—like moving sunspots—on the surface, then will use these specific locations to calculate accurate pointing of the narrow-angle imager for later detailed observation.

Since the instruments are fixed in place to the spacecraft body, the entire spacecraft must be pointed with high precision to point to specific sunspots.

This cycle of using wide-angle images to select specific narrow-angle targets, then feeding the needed pointing back into flight control instructions takes place daily, with each iteration taking three days from initial imaging to uplink of new pointing instructions.

While such close coordination happens throughout the mission, the cycle is much speeded up during perihelion passage to ensure the best possible scientific value from up close to the sun.

Provided by European Space Agency

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