TRUTHS

Setting the gold standard reference for climate measurements

A benchmark for climate data

ESA goes to great lengths to ensure that the data beaming back to Earth from satellites are as reliable as possible. But how can we be sure that measurements from space are truly accurate, especially when it comes to the all-important data needed to assess climate change? The Traceable Radiometry Underpinning Terrestrial- and Helio-Studies mission, or TRUTHS for short, will lay any such doubts to rest. This new satellite, which ESA is building under the umbrella of its Earth Watch programme and on behalf of the UK, will provide traceable International System of Units (SI) measurements of incoming solar radiation and of radiation reflected from Earth back out into space, with which to calibrate data from other satellites. In effect, TRUTHS will be a 'standards laboratory in space', setting the 'gold standard' reference for climate measurements.

The truth about climate

There is little doubt that human activity is having a disastrous effect on Earth's natural processes – and it seems we are on the brink of catastrophe unless the climate crises is addressed. When it comes to underpinning decision-making, satellite data records are critical, but confidence in these data is of utmost importance. TRUTHS will provide the benchmark reference for radiation measurements to improve our understanding of climate change and help increase the precision of climate models. This will help to monitor the effectiveness of international policy to fight the climate crisis.

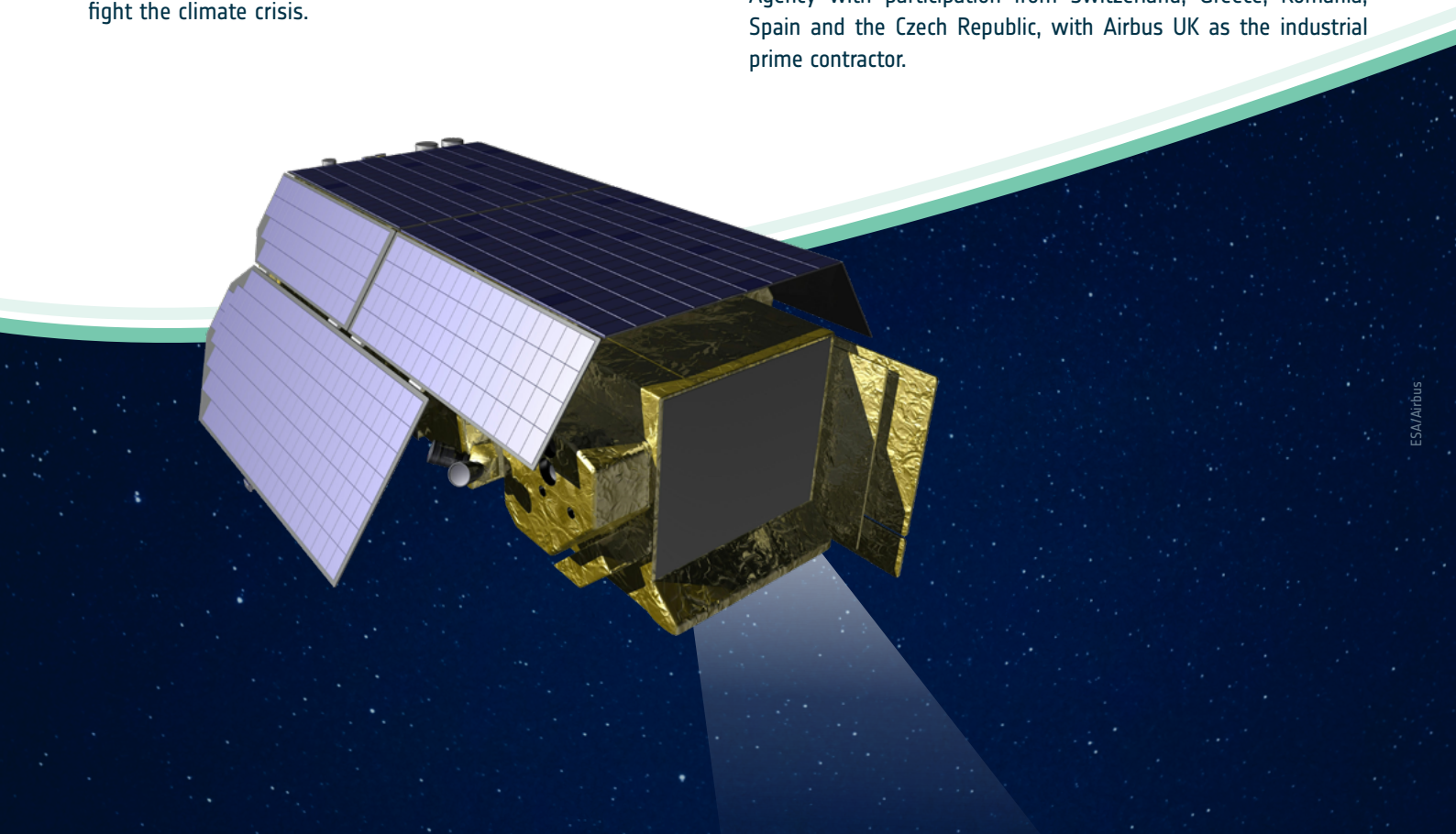
Radiating the truth

Essentially, the amount of incoming solar energy compared to the amount that bounces back to space controls our climate. An accurate knowledge of these energy exchanges is fundamental to understanding and monitoring change. The TRUTHS satellite carries two main instruments: the Cryogenic Solar Absolute Radiometer and the Hyperspectral Imaging Spectrometer as well as a novel onboard calibration system. Together, these instruments will make continuous measurements of both incoming solar radiation and reflected radiation. These two observations will be used to evaluate the energy-in to energy-out ratio. The unprecedented quality of these measurements will also offer the standard reference against which observations from other satellites can be corrected. The spatial and spectral resolution of the mission will also allow greater understanding of the causes of change in energy balance and help assess progress stemming from climate action.

Working together for the truth

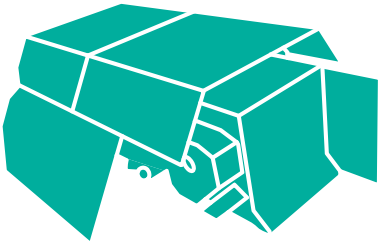
NASA is also developing the CLARREO Pathfinder instrument, which will fly on the International Space Station, and an overarching CLARREO satellite concept, both similar to TRUTHS. Together, these are set to be founding elements of an climate and calibration observatory.

TRUTHS is being developed by ESA and is led by the UK Space Agency with participation from Switzerland, Greece, Romania, Spain and the Czech Republic, with Airbus UK as the industrial prime contractor.



ESA/Airbus

Facts and figures



Launch	2030
Launcher	Vega-C/Vega-E
Orbit	altitude of approximately 610 km; polar non-Sun-synchronous
Mission life	five years (carries consumables for eight years)
Satellite	prismatic-shaped platform with fixed solar panels, weighing approximately 1750 kg (including 150 kg fuel, allowing for re-entry to prevent space debris)
Power	1300 W
Instruments	Hyperspectral Imaging Spectrometer (HIS): acquires Earth (plus Sun and Moon) samples across the whole spectral range, from ultraviolet to infrared (320–2400 nm), operated at –123°C Cryogenic Solar Absolute Radiometer (CSAR): operating at approximately –210°C, measures solar radiation and serves as the 'gold standard' reference, traceable to SI-units Onboard Calibration System: shines solar light and beams of different wavelengths, generated by dispersing the solar light in a device called a solar polychromator, to the CSAR as a reference
Revisit time	61 days; six cycles per year to characterise the full diurnal cycle and seasonal variations over the whole globe
Mission control	ESA's European Space Operations Centre (ESOC) in Darmstadt (DE) for the launch and early orbit phase; then a mission control centre in the UK (TBD)
Communication	one or two polar ground stations, for example, Svalbard (NO)/Kiruna (SE)
Operations & data processing	data centre in the UK (TBD). ESA implements a free and open data access policy.
Project and commissioning	managed at ESA's European Space Research and Technology Centre (ESTEC) in Noordwijk (NL)
Prime contractor	Airbus Defence and Space (UK)

For further information

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