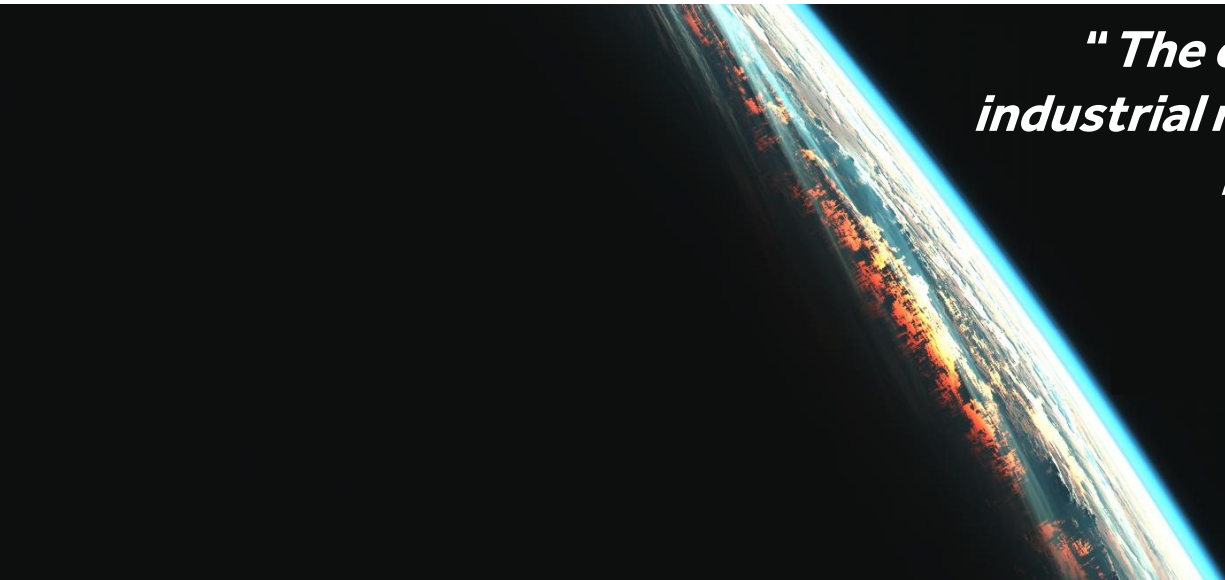


ADVANCES IN SPACE TECH

FOR CLIMATE ACTION

A photograph of the Earth's horizon from space, showing the blue atmosphere and the dark, textured surface of the planet.

***" The climate crisis needs a new
industrial revolution – but it doesn't
have to be on this planet"***

Grahame Peters, Chair of UKspace,
the trade association of the UK space industry

Image Credit: JAXA JMA , Proud, S. University of Oxford

ABOUT US

Uniting UK space-enabled climate expertise and services

Who we are

Chaired by the UK Space Agency, Space4Climate spans government, industry and academia, uniting those with expertise in the development of satellites, analysis and exploitation of data they gather, and production of quality assured global data and climate services.

Trusted services

Our mission is to ensure a seamless supply of trusted climate intelligence from space so that the UK offers a thriving, supportive environment for the development of quality assured products and services enabling climate-smart decisions, disclosures and climate-sensitive planning.

What we do

We connect UK producers and global users of trusted Earth observation data and actionable space-enabled climate analytics and services. We respond rapidly to emerging needs and develop new opportunities and collaborations. Discover more about our membership activities.

FROM MISSION TO EMISSIONS

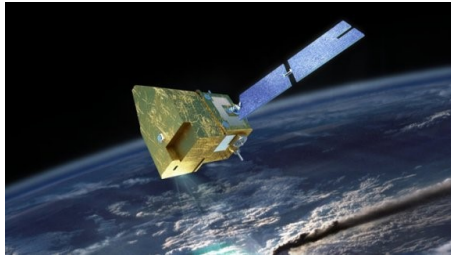
Data creation

Dataset collation and platforms

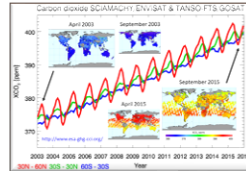
Data verification and quality assurance

Information translation and big data analytics

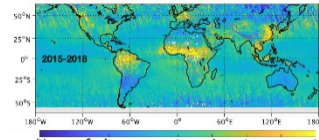
Value-added services



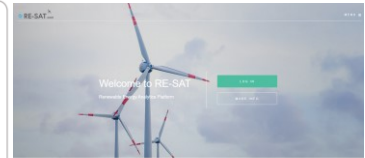
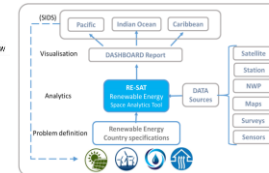
Artist's impression of the MicroCarb satellite.
Image: CNES.



More information:
<https://climate.esa.int/en/projects/ghgs/about/>
Access the data from 2002:
<https://cds.climate.copernicus.eu/cdsapp#!/dataset/satellite-carbon-dioxide>



Map of the most persistent carbon dioxide "anomalies" seen by OCO-2
Credit: NASA/JPL-Caltech



About RE-SAT
To support the generation of renewable energy, governments, investors, business, RE-SAT helps companies and individuals find the optimal energy sources. RE-SAT helps companies and individuals find the optimal energy sources. RE-SAT helps companies and individuals find the optimal energy sources.

NEW MISSION WILL MEASURE GLOBAL AND CITY EMISSIONS

Lead contact : Prof Hartmut Boesch, University of Leicester and NCEO

MicroCarb Mission: to measure sources and sinks of Carbon Dioxide, launch 2022

Resolution and temporal availability:

- Orbit: 25 days - 7 days sub-cycle
- Total column concentration of CO₂ (accuracy 1-2ppm), pixel size of 4.5 km x 9 km (40 km²)
- "City mapping mode" with higher resolution of 2 x 2 km²

MicroCarb, a joint UK-French satellite mission which will measure sources and sinks of carbon. The mission, scheduled to launch in 2022, will also contribute to international efforts to measure how much carbon dioxide (CO₂) is being emitted and absorbed by natural processes and human activities.

UK scientists are involved in developing the data processing to obtain the concentrations of CO₂ from the satellite and to determine corresponding geographical distributions of CO₂ fluxes.



Artist's impression of the MicroCarb satellite. Credit: CNES

UK involvement in this mission also involves the engineers at Thales Alenia Space who will manage and deliver the satellite Assembly Integration and Test programme at the UK's National Satellite Test Facility in Harwell

MULTI-SCALE EMISSION MONITORING

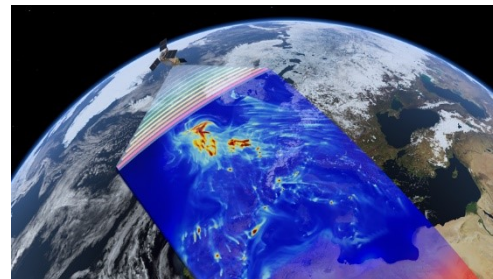
Lead contact : Katherine Elsom, Market Development Manager, Airbus Defence and Space Intelligence UK

Products: Asset level monitoring and investigation on activities such as shipping, airports, mining and refineries, can help to demine more specific sources of greenhouse gas emissions.

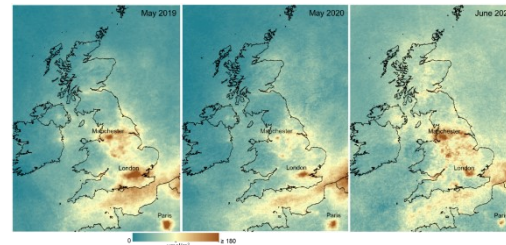
Examples:

- applying data from the S-5P TROPOMI sensor in conjunction with high-resolution satellite imagery to enhance monitoring of methane from refineries.
- development of an enhanced greenhouse gas monitoring system at local and regional scales by integrating multiple data sources from satellites and ESA's Climate Change Initiative data products e.g. Land Surface Temperature.

Airbus' Intelligence team in the UK has a 30+ year heritage in managing petabytes of Earth Observation (EO) data from multiple satellite missions on behalf of ESA, UKSA and commercial customers. Airbus uses this expertise in EO data management and processing, combined with an active engagement in climate analytics applications to generate insights for a range of end users.



Sentinel-5 Precursor, launched in October 2017, monitors Earth's atmosphere, with high spatial and temporal resolution. The satellite detects pollutants such as nitrogen dioxide, methane, ozone, formaldehyde, sulphur dioxide, carbon monoxide and aerosols. Credit: ESA



Airbus carried out an analysis of S-5P data to assess the impact of the first coronavirus lockdown on air quality over the UK, revealing an emission concentration reduction of 20-50% © ESA/ATG medialab

PEATLANDS CLIMATE ACTION EMISSIONS MONITORING

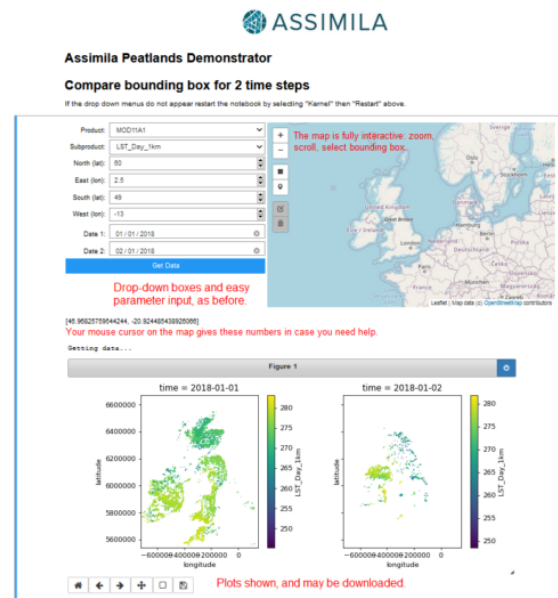
Lead contact : Briony Turner, Space4Climate

Product: Data cube to harness EO data for the monitoring of peatlands and restoration actions to reduce emissions from them.

- built on DataCube facilities developed at Assimila UK,
- provides land surface temperature, vegetation indices and surface reflectance information at 1 km resolution, in a timely and accessible format.
- being used to monitor peatland recovery in the North Yorn Moors. Time series analysis for a specific location or locations allows direct monitoring of land surface recovery, and area comparison at time points of interest provides maps of vegetation indices and surface temperature.

Assimila UK have built on existing Data Cube capabilities to provide a flexible platform with scientific and commercial applications. Prof. Fred Worrall at Durham university is the science lead, providing insight and expertise in Peatland quality

The demonstrator can in principle be used to monitor temperature and vegetation changes over any area of interest in the UK, including for monitoring of greenbelt land, urban spread, urban heat maps and many other applications.



RE-SAT: RENEWABLE ENERGY SPACE ANALYTICS TOOL

Lead contact : Lead contact: Colin McKinnon, CEO, Institute for Environmental Analytics (IEA)

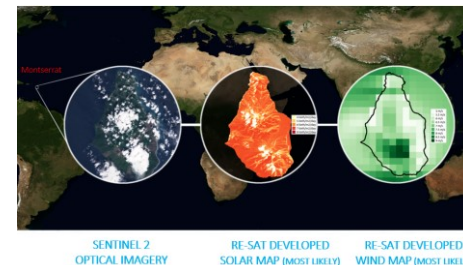
Product: Whether assessing single project sites or developing complex 30 year national energy roadmaps, RE-SAT provides rigorous scientific data to help maximise the operational return on investment. It helps reduce the costs of project finance, implementation, energy production and the economic risks of reliance on fossil fuels.

- Identify best renewable energy mix
- Simulate simple or complex renewable generation scenarios
- Estimate power production taking account of environmental variables
- Assess the potential financial viability of renewable energy investments
- Plan where to locate different assets

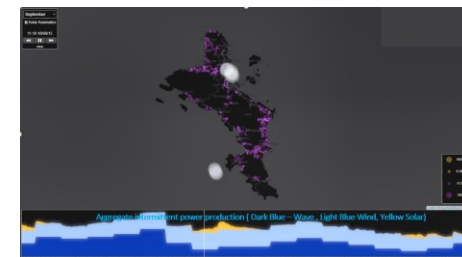
RE-SAT was developed by the IEA, with funding from the UK Space Agency International Partnership Programme, initially to help Small Island Developing States meet their renewable energy targets, be energy-independent, reduce their global greenhouse gas emissions and diversify their economies. The cloud-based platform is due to be rolled-out commercially in 2021 to provide best in class data analysis aimed at improving pre-feasibility assessment of new energy infrastructure projects worldwide.

www.space4climate.com

 @space4climate



RE-SAT uses advanced modelling techniques to quantify solar and wind energy potential by location (in this case Montserrat)



This scenario shows a mix of utility scale wind and wave generation (large circles) and distributed rooftop solar (approx. 1000 smaller circles) distributed around the Seychelles

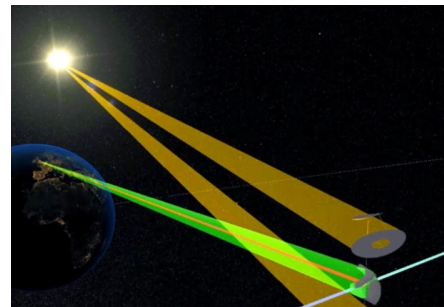
UNDER INVESTIGATION: SPACE-BASED SOLAR POWER SYSTEMS

Potential: space-based solar power (SBSP) systems that would use very large solar power satellites to collect solar energy, convert it into high-frequency radio waves, and safely beam it back to ground-based receivers connected to the electrical power grid.

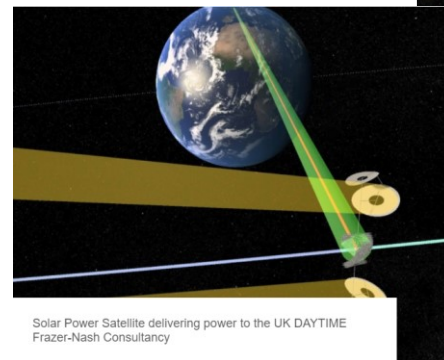
The UK government has commissioned new research, being led by Frazer-Nash Consultancy with Oxford Economics, to consider:

- the engineering and economics of an operational SBSP system by 2050. – whether it could deliver affordable energy for consumers,
- comparison of SBSP alongside other forms of renewable energy, to see how it would contribute as part of a future mix of clean energy technologies.
- the engineering and technology required to build it
- How to assemble the massive satellites in orbit, which has not been done before at this scale.

Frazer-Nash Consultancy are forming an expert panel, comprised of leading SBSP experts and space and energy organisations, to gain a range of industry views.



Solar Power Satellite providing power to the UK NIGHT TIME
Frazer-Nash Consultancy



Solar Power Satellite delivering power to the UK DAYTIME
Frazer-Nash Consultancy

Image credits: Frazer-Nash Consultancy

SUPPORTING A HEALTHY, RESILIENT, ZERO CARBON RECOVERY

Lead contact : John Swinton | Telespazio VEGA UK, Climate Risk Disclosure Task Group Chair

Task Group action: The Task Group has produced a demonstrator to showcase the wide range of high-quality, open access climate data and the variety of bespoke data-derived products and services available to inform and support climate action.

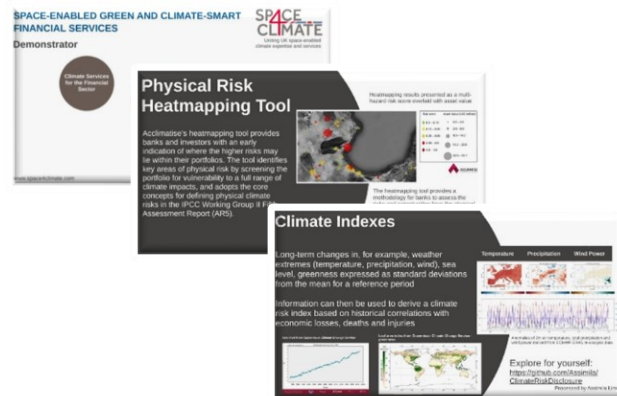
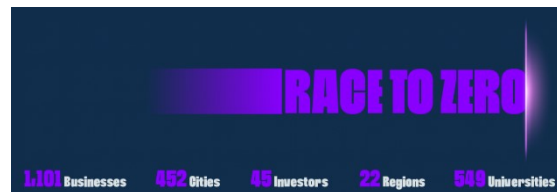
The use of high spatial and temporal resolution satellite-derived climate datasets, combined with other spatial data and climate scenario modelling, could aid financing of net zero assessments and decision making in the following areas:

- Task Force on Climate-related Financial Disclosures (TCFD) climate risk disclosures
- Statement of Investment Principles for climate risk
- Insurance risk and exposure
- Sustainable investment requirements under the EU Taxonomy for the certification of Post-CAP Green Finance (such as a Sovereign Green Bond)
- Environmental considerations for Environmental, Social, and Governance (ESG) criteria to climate change mitigation and adaptation
- Contribution of investments to global UN 2030 Agenda and Sustainable Development Goals (SDGs)
- Financial innovation such as FinTech.

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www.space4climate.com/space-enabled-climate-risk-disclosure-for-the-financial-services-sector/





Contact us:
info@space4climate.com