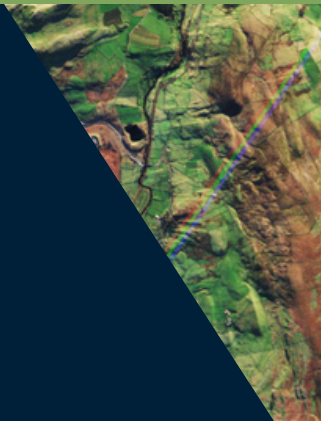


# GREENSPACE

SPACE HUB YORKSHIRE



Accelerating the Use of Space  
Technology for Finance and Agriculture

# ABOUT GREENSPACE



**Space Hub Yorkshire** is a key member of the UK Space Agency's thriving network of regional space clusters, responsible for coordinating local space-related activity and driving investment and commercial opportunities across the whole of Yorkshire.

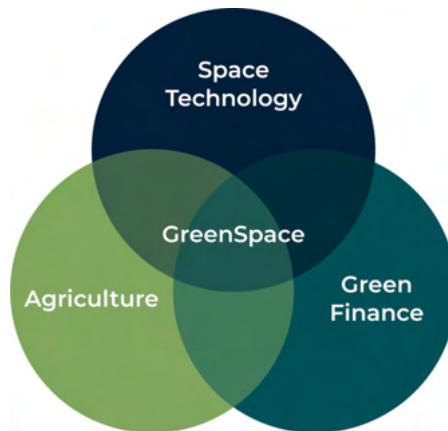
Our goal is to **unlock space for the people and businesses of Yorkshire**, raising skills, raising aspiration, and delivering prosperity for all.

The UK is a top **financial centre** and has world-class expertise in **satellite data** and applications – with the Yorkshire region a hub of activity for both sectors. **Agriculture** is also crucial to the Yorkshire and Humber economy – generating £662 million in revenue in 2022 alone [1]. To build upon these three Yorkshire capabilities, Space Hub Yorkshire secured funding from the **UK Space Agency** to lead a high-impact, market making project called **GreenSpace**.



# THE PROJECT

GreenSpace was designed to identify and tackle the barriers to wider space technology adoption in the agricultural and financial sectors. Of particular interest is the overlap between all three sectors, where space data and technology can be used to support green finance products that promote sustainable farming practices, and vice versa.



GreenSpace also aimed to increase the rate of adoption of space technology for other environmentally-related applications in sectors such as logistics and infrastructure.

This document provides an introduction to the GreenSpace project and the concepts it is based upon, an overview of the current status of and opportunities for GreenSpace-related activity in the UK, and the opportunities for GreenSpace activity moving forward.

# OUR GOALS

1. Forge connections amongst the finance, space, and agriculture sectors in Yorkshire, and across the UK.
2. Raise awareness of space-based data, its applications, and access methods.
3. Demonstrate the applications of Earth Observation (EO) data in a variety of markets through industry and academic collaborative research projects.
4. Connect opportunities to providers, including grant and investment funding and longer-term product development collaborations
5. Identify and tackle the barriers to the commercial use of EO data.



By fostering collaboration, enabling investment, and engaging with experts from a range of industries, GreenSpace aims to unlock economic growth and enhance Yorkshire's and the UK's position as a leader in space-driven innovation.

***GreenSpace is where space technology meets finance and agriculture.***



# OUR IMPACT





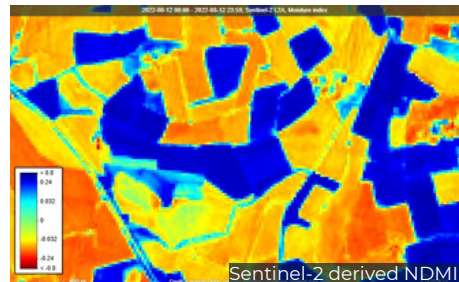
Sentinel 1, artist's Impression, credit ESA.

# HOW IS **SPACE TECH** RELEVANT?

Many different space technologies, like satellite navigation or communications, can be used for Earth-based applications. GreenSpace focusses on the use of satellite imagery and radar data for the finance and agricultural sectors.

In agriculture, satellite data can be used to support or provide evidence of sustainable farming practices – particularly important for accessing government subsidies [2]. In combination with GPS data, satellite imagery can facilitate precision farming – for example, restricting the application of fertilizer to specific areas in need, reducing both the financial and environmental burden of excess fertiliser use [3]. It can also enable precise monitoring of crops, the mapping of large-scale crop growth, improvement of yield predictions, and the identification of disease outbreaks – amongst many other applications [3].

In finance, satellite data can be used as an unbiased and standardised source of near real-time data across a financial institution's interests. These data can support existing risk assessment and management strategies, including climate-related physical risks [4].







# THE GREENSPACE OPPORTUNITY

The global transition to Net Zero requires an increase in the availability of innovative green finance products that incentivise better environmental benefits. EO-enabled research and innovation will be key to developing advanced financial products and services that can support and accelerate the UK's progress towards Net Zero.

Increased use of EO data for green finance and agricultural technology products and services will help businesses operating in those sectors leverage investments and unlock new market opportunities.



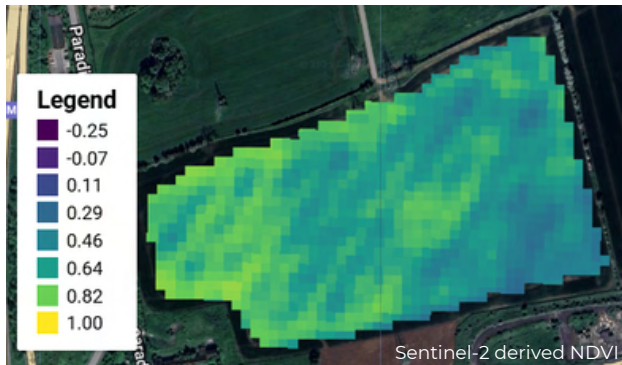
To that end, GreenSpace is supporting an array of proof-of-concept studies and collaborations to demonstrate the wide-ranging applications of space technology, including:

- Environmental impact reporting
- Broader barriers and recommendations for improving satellite data use
- Biodiversity monitoring
- Streamlining ground measurements and farmland assessments for sustainability certification schemes
- Supporting insurance quote assessments

# EXAMPLES OF EO DATA & APPLICATIONS

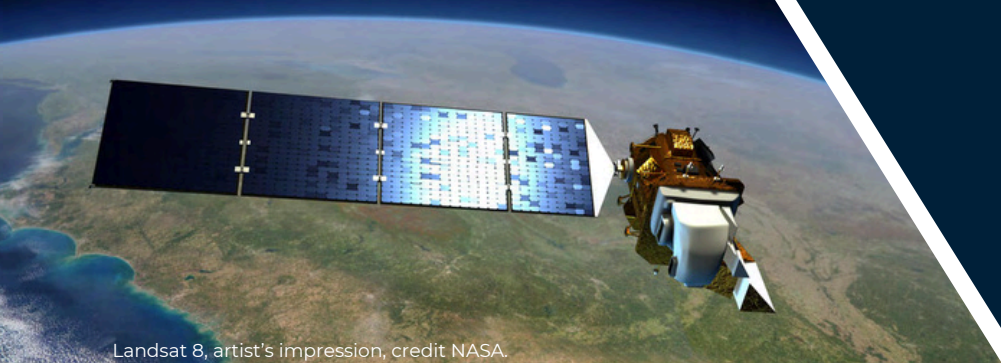
EO is the process of using remote sensing technologies, like satellite sensors, to observe and monitor our planet. The sensors used can be passive, capturing, for example, visible light (showing surface features), short-wave infrared (helping assess vegetation health), or thermal images (detecting heat variations), or active, such as Synthetic Aperture Radar (SAR) which emits signals and measures their reflection.

The image below shows the normalised difference vegetation index (NDVI) of a field, derived from Sentinel-2 satellite data. NDVI is a widely-used metric for quantifying the health and density of vegetation, calculated from spectroscopic data at two specific bands: red and near-infrared (NIR). NDVI is valuable to farmers as it provides a reliable and cost-effective way to remotely monitor crop health and make yield predictions.



NDVI has a high correlation with the true state of vegetation on the ground and is relatively easy to interpret. It's value ranges from -1 to +1, with values closer to +1 showing areas of denser, healthier vegetation growth, values closer to 0 indicating bare soil or sparse vegetation, and values closer to -1 showing water or non-vegetated surfaces.





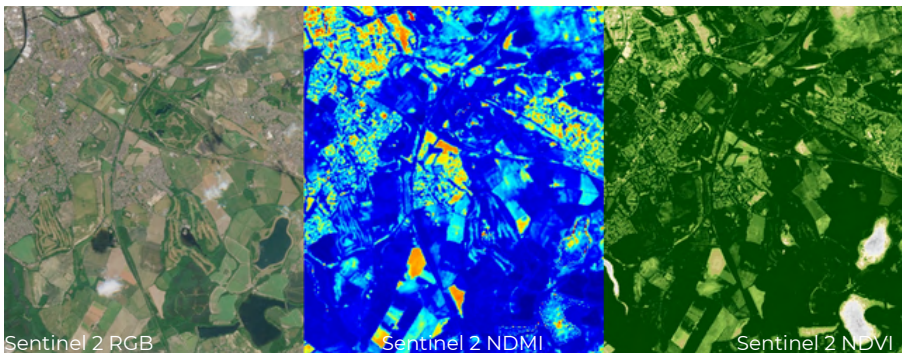
Landsat 8, artist's impression, credit NASA.

The image below shows other data products derived from Sentinel-2 data. On the left is an RGB image, centre is a derived normalised difference moisture index (NDMI) image, and on the right is another NDVI image.

NDMI is typically derived from NIR and shortwave infrared (SWIR) data and helps farmers to monitor crop water stress and optimise irrigation, detect fire-prone regions by identifying dry vegetation, and can also support flood monitoring by indicating areas of saturated soils. NDMI could also be used to help monitor sustainable land use, ensuring compliance with environmental policies and reducing financial exposure to financial risks.

Other useful EO-derived data include:

- Enhanced Vegetation Index (EVI)
- Land Surface Temperature (LST)
- Leaf Area Index (LAI)
- Digital Elevation Models (DEM)

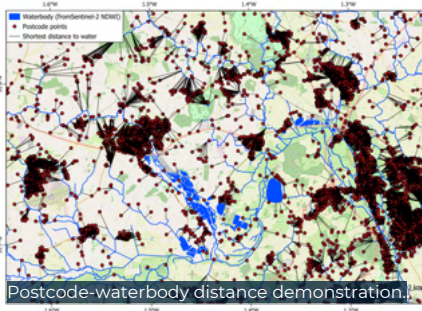


These EO data are valuable across the agricultural and financial sectors. They can be used to optimise crop management and yield forecasting, improve commodity market predictions and risk assessments, and support sustainable land use monitoring, deforestation tracking and climate risk analysis, to name but a few.

# RESEARCH &

GreenSpace has led or supported collaborations to develop an array of proof-of-concept and pilot projects. These were designed to demonstrate and advance the wide-ranging applications of space technology. This section is dedicated to a brief description of some of these projects.

## Opportunities for EO to Support Insurance Comparison Providers - Go.Compare



SHY, in collaboration with Go.Compare, explored opportunities for EO to enhance insurance comparison services. The project trialled solutions to assess watercourse and tree proximities to properties using only free satellite and geospatial data. The study resulted in a report and proof-of-concept demonstration, which were shared as a potential foundation for wider adoption of EO in insurance quotation tools.

*"The team at Space Hub Yorkshire are fantastic to work with. They are collaborative educators who in a short space of time have helped Go.Compare to understand how geospatial data could not only work for us, but how to get to grips with it too. We look forward to future collaboration with the team & thank them for their support."*

*Hoodi Ansari, Director of Data & Operations, Future/Go.Compare*

## Barriers to Downstream Earth Observation Applications and Services and Impact of Interventions - Perspective Economics

SHY, in collaboration with Perspective Economics, is conducting a study into the barriers to downstream EO applications and services. The study consists of an in-depth analysis of the current state of the UK's public and commercial EO market, an assessment of interventions by governments within the UK and abroad, and an extensive stakeholder engagement campaign via both online survey and live consultations.

The study, due to be completed in March 2025, will result in a report providing recommendations for addressing the barriers to EO adoption in the public and commercial sectors. The outputs will also include an in-depth cost-benefit analysis of potential future Government interventions.



# DEVELOPMENT

## Leveraging EO Imagery for Biodiversity Assessment in Food Production Systems – Agtelligence & Airbus

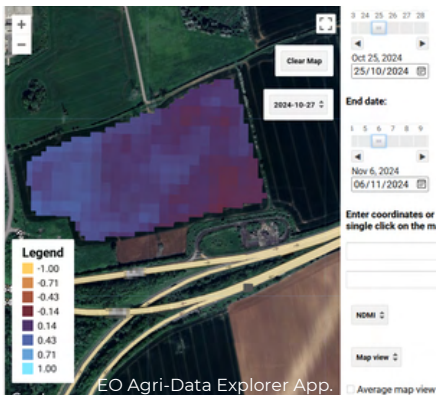
Typically, monitoring biodiversity on farmland is an expensive and labour-intensive activity. Agtelligence, a company focused on promoting sustainable agriculture practices using Earth Observation (EO) technology, collaborated with Airbus Space and Defence, with support from GreenSpace, to simplify this process.

By combining AI and high-resolution satellite data, they aimed to streamline the monitoring of biodiversity. The project focused on assessing the quality of biodiverse habitats, particularly woody features, natural on-farm areas, and woodland patches, which are significant for UK farmland. These assessments were integrated into Agtelligence's existing FarmScore® system, enhancing sustainability monitoring capabilities.



## Assessing the Utility of EO data to Support Farm Sustainability Certification

EO data can be used to supplement ground measurements of farming activities, techniques, and aid in near real time assessments of, for example, crop and soil health, and water usage. However, it is not easy for an organisation that is new to using EO data to assess what data would be appropriate and whether the cost is worth the benefit for their organisation.



To allow organisations to independently assess the utility of EO data, GreenSpace has produced an app (EO Agri-Data Explorer) that allows a user to select a field within the UK and access snapshot or time-averaged maps of agriculturally useful EO-derived indices and maps for free. The app uses Sentinel 2 data, processes it and clips the data to the field boundary. The app is a learning and exploration tool, and the user guide refers users onwards to organisations and resources to further their exploration of EO data, broadening access.

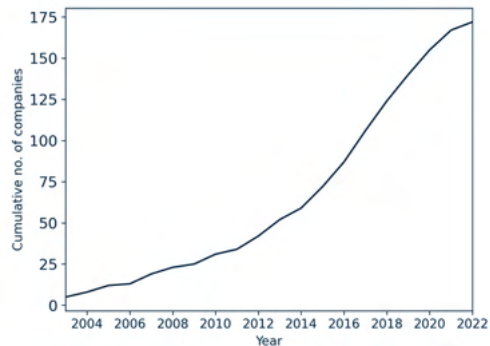
# LANDSCAPE REVIEW HIGHLIGHTS

GreenSpace collaborated with Perspective Economics, an economics consultancy firm, to produce a Landscape Review that assessed the UK's GreenSpace-relevant industries as well as a comprehensive review of GreenSpace-relevant policy. Highlights of the study are found below, with further details available in the published study [5].

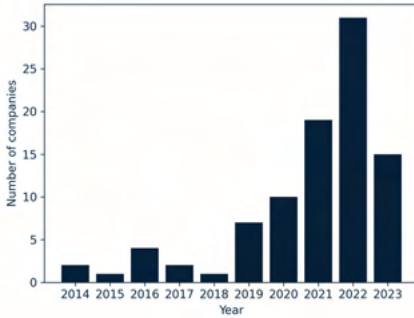
The study initially identified over 1,000 GreenSpace-relevant companies across various sectors, which was narrowed to approximately 200 UK-based firms whose prime focus was on GreenSpace-related products and services, and excluded multi-nationals and multi-sector companies.

The sample companies have seen an average employee growth of 47% between 2018 and 2021/22. Over half of the companies were incorporated in the last 8 years, and a third were incorporated in the last 5 years, suggesting a surge of activity. The Landscape Review study also sets out the top 10 organisations by turnover between 2018 and 2022, with a total turnover for those organisations in that period of £3.5bn [5, page 17].

Sum of UK GreenSpace-focussed company incorporations [5].  
Source: Fame - Bureau van Dijk Electronic Publishing Ltd, 2023



An analysis of the GreenSpace-focussed firms in the UK, US, France, and the Netherlands, categorised the companies into Ag-Tech, Green Finance, Air Quality, Sea-Level Risk & Coastal Water, Carbon Credits, and Space. The UK's



Date, where known, of latest private investment fundraising from the sample companies [5].  
Source: Beauhurst 2023.

total equity funding (\$619m across 330 firms) is lower than the US (\$13b, 1,642 firms) and France (\$913m, 130 firms) but higher than the Netherlands (\$308m, 110 firms), with the US having the highest average funding (\$30m) and the UK the lowest (\$9m). In all four countries, Ag-Tech firms dominate in number but receive lower average investment than other sectors, ranking second after space in the UK despite securing the most total funding.

A sample of UK Greenspace-focussed companies are profiled below.

| PlanetWatchers   | Assimila   | Messium  |
|--|--|--|
| <ul style="list-style-type: none"> <li>Secured just under £11.5m in grants and investment between 2019 and 2023</li> <li>Geospatial analytics specialising in agriculture, particularly crop insurance</li> <li>Crop monitoring by Synthetic Aperture Radar and optical imaging</li> </ul> | <ul style="list-style-type: none"> <li>Received over £1.23m in grants from Innovate UK between 2013 and 2023</li> <li>EO consultancy specialising in environmental data applications, integrating EO data with models to provide actionable insights for agriculture, climate, &amp; environmental monitoring</li> </ul> | <ul style="list-style-type: none"> <li>Raised £1.5m in grants and investment in 2024 alone</li> <li>Geospatial data analytics from satellite data to monitor land use, crop health and vegetation, as well as monitoring &amp; managing natural resources</li> </ul> |
| Agvesto Limited  | Outfield Technologies  | Earth-i  |
| <ul style="list-style-type: none"> <li>Technology driven insurance and sustainable finance</li> <li>Parametric insurance products for farmers and agricultural businesses to protect against natural and climate hazards</li> </ul>  | <ul style="list-style-type: none"> <li>Raised over £2.13m in grants and investment since 2019</li> <li>Remote sensing and crop monitoring, field data collection tools, and software for farm management</li> </ul>  | <ul style="list-style-type: none"> <li>Almost £10m in grants &amp; investment since 2015</li> <li>Agricultural land mapping &amp; crop classification, vegetation and crop health monitoring, site-specific yield management programmes</li> </ul>                   |

# OUR EVENTS

## GreenSpace Workshop 2023 - June 23rd, 2023

The GreenSpace Workshop was hosted and organised by Greenspace in collaboration with Perspective Economics, and aimed to facilitate collaboration among diverse stakeholders. The day consisted of informative talks from leading University of Leeds academics, interactive discussions centred around the opportunities and challenges associated with effectively utilizing EO and other real-time data, and networking opportunities. The results of the landscape review were also presented. As a result of this workshop, several pilot project studies were developed.



## Earth Observation for Sustainable Finance - April 17th, 2024

This event was a collaborative Satellite Applications Catapult and GreenSpace event, designed to bring together stakeholders from the EO and finance sectors.



Speakers included representatives from the Centre for Greening Finance and Investment, Virgin Money, Agtelligence, Verisk Maplesoft, Deloitte, Satellite Applications Catapult and SHY. The event was designed to inform participants about how EO data can support their businesses to be part of the worldwide sustainable finance movement, and workshop problems and solutions around the use of EO data and technology in sustainable finance.

## GreenSpace Webinar Series

The GreenSpace Webinar series hosted 3 webinars between Oct 2024 and Feb 2025, and featured speakers from Compass Informatics, Oxbury Bank, SatSense, Agtelligence, Lloyds Banking Group, LiveEO, GHGSAT, and the University of Oxford. Each webinar included an overview of SHY and the GreenSpace Project and a showcase of three applications of satellite data. These covered applications in agriculture and finance, as well as in disaster management, climate change mitigation, waste management, and utility monitoring.





# LOOKING TO THE FUTURE

To ensure that the GreenSpace project can capitalise on & develop the opportunities identified here, we have created an action plan.

| Actions  | Timeline | Difficulty  |
|--|----------|-------------|
| Continue to deliver <b>pilot projects</b> to demonstrate the applications of EO data in a variety of markets through collaborative research projects.  | Short    | Moderate    |
| Facilitate <b>knowledge exchange events</b> to bring different sectors together to raise awareness of the opportunities of EO data, connect providers to users, & facilitate wider training.   | Short    | Easy        |
| Support the growth of the <b>GreenSpace network</b> spanning the space, finance &, agricultural sectors and beyond. Bring local champions and specialist networks such as Bankers for Net Zero into the network to facilitate wider connections. | Short    | Easy        |
| <b>Extend successful pilot and case studies</b> to address broader problems or problems at scale. Ensure the solutions developed are scalable but tailored to their users or environments.   | Medium   | Moderate    |
| Support the development of <b>training schemes</b> or workshops that can be deployed to address skills shortages that act as a barrier to wider EO use in non-space or space-adjacent sectors.   | Medium   | Moderate    |
| Support public & private sector organisations pursuing <b>funding grants or investment</b> for GreenSpace related activity.  | Medium   | Moderate    |
| <b>Market monitoring:</b> track the GreenSpace-related markets to identify trends & opportunities, adjust stakeholder engagement strategies, & support targeted government lobbying.   | Long     | Moderate    |
| <b>Scale successful pilot projects</b> to a national or international levels. Convert successful projects into commercially viable products or services in collaboration with industry.  | Long     | Challenging |
| Identify and support the development of <b>policy initiatives</b> that would support GreenSpace activity, including data access, skills shortages, and sustainable development.  | Long     | Challenging |
| Identify, support, & lobby for longer term <b>funding &amp; investment opportunities</b> for GreenSpace related activity in the UK. Support commercial & academic organisations in their bids for funding.                                       | Long     | Moderate    |

# CONTACT US



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