



Earth Observation Conference 2019

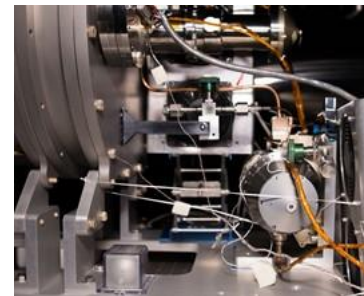
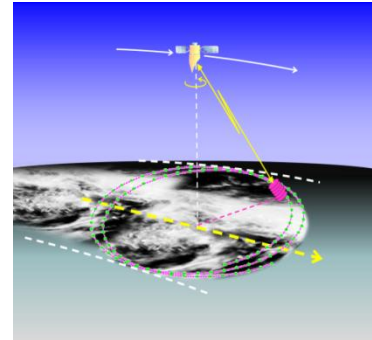
Science, Missions and Technologies

2nd - 5th September 2019

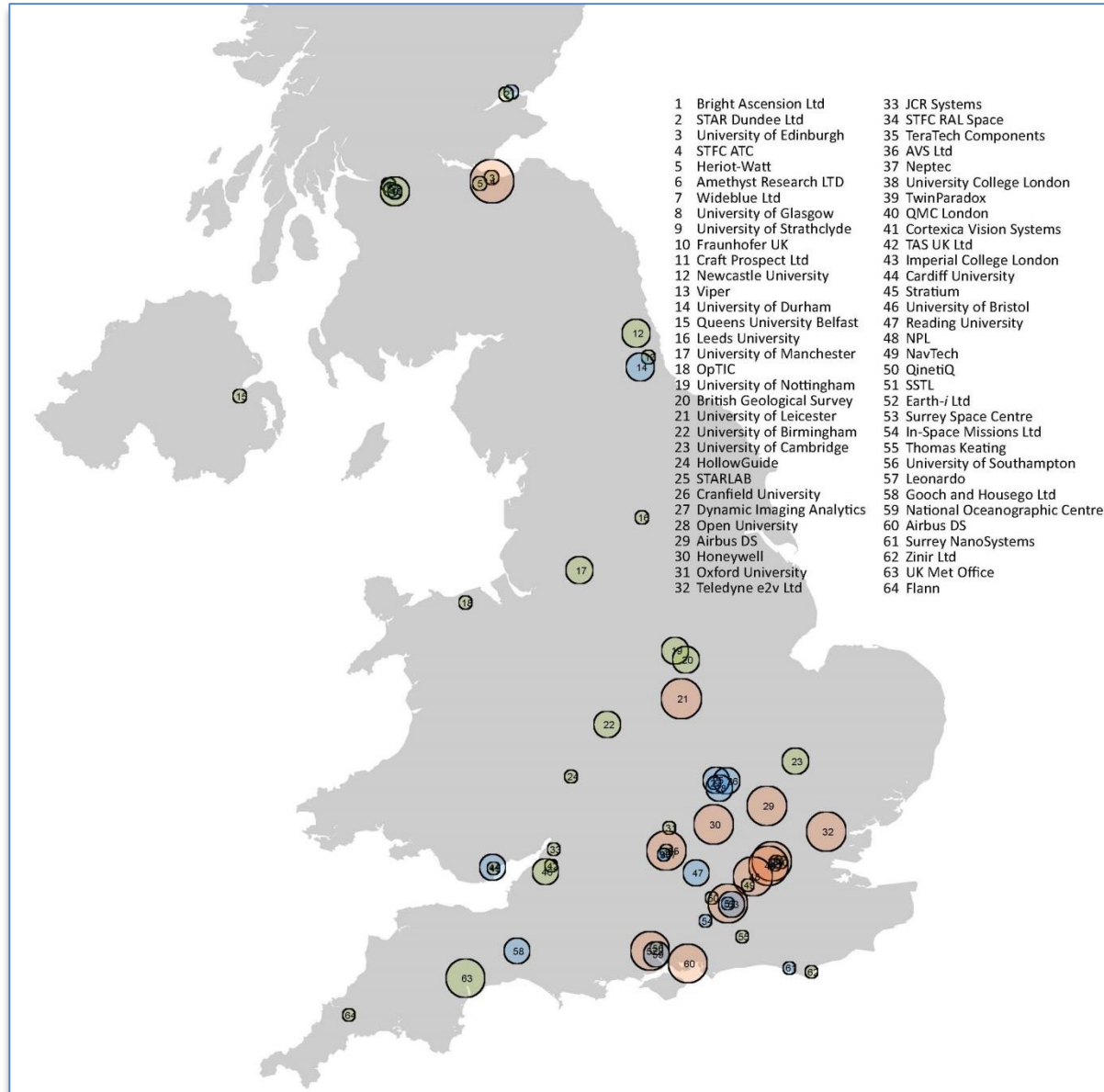
Mick Johnson
Director of CEOI

What is the CEOI?

- UK Space Agency initiative to strengthen UK EO technology capability, with enhanced breadth and depth
 - Funds innovative technologies for global EO mission opportunities
 - Supports developments for commercial exploitation opportunities
 - Creates new UK jobs and economic growth through leverage of investment in EO
 - Parallel industry investment, total approx £3M pa
- CEOI Programme focus on:
 - development of new EO instrumentation and technologies, taking EO technologies to higher TRL
 - horizon scanning and knowledge exchange
 - building highly capable academia/industry partnerships
 - Liaison with UKSA and ESA
- Partnership led by Airbus with QinetiQ, STFC/RAL and University of Leicester



Geographical distribution of UK EO Capability



UK EO Technology Capability



Technology Theme	UK Strength	Market Trend	Comments
Radar/SAR	✓✓✓	✓✓✓	Excellent & established UK capability; Significant commercial/operational/science markets
Passive microwave	✓✓✓	✓✓✓	Excellent & established UK capability; Ongoing operational/science markets
Optical imaging	✓✓✓	✓✓✓	Excellent & established UK capability; Significant commercial/operational markets
Optical spectroscopy	✓✓✓	✓✓✓	Excellent and established UK capability; Significant commercial/operational markets
IR imaging	✓✓	✓✓✓	Growing UK capability; Growing commercial/operational markets
IR radiometry	✓✓✓	✓✓✓	Excellent and broad UK capability; Ongoing operational/science markets
IR spectroscopy	✓✓	✓✓✓	Growing UK capability Ongoing operational/science markets
LIDAR	✓	✓✓	Growing UK capability; Viability of space-based LIDAR recently established (Aeolus)
Radar Altimetry	✓	✓	Some UK capability; Strong competition within Europe
UV spectroscopy	✓✓	✓	Good UK capability Limited user pull and mission opportunities
Quantum Technologies	✓✓	✓✓	Growing UK capability; Space market is long term; non-space market more immediate

Our 10-year vision is for the UK to become a world leader in new EO technologies

- **Economic Impact:** Develop EO technologies which lead to increased exports, jobs and economic growth
- **Innovation:** Support new and innovative ideas that offer tangible benefit to future missions
- **Capability:** Strengthen capability where the UK already leads, can build a lead in a new area or can overtake existing capability elsewhere
- **Return on ESA Investment:** Maximise the benefit from the UK funding to ESA and other institutional bodies

ESA Earth Explorer Candidates



- Earth Explorer 9 Candidates

- SKIM

- wide-swath scanning multibeam radar altimeter to measure ocean-surface currents

- FORUM

- measure far-infra-red radiation emitted from Earth

- Earth Explorer 10 Candidates

- G-CLASS Hydroterra

- Geo-stationary SAR for water cycle science

- HARMONY/STEREIOD

- SAR to measure small shifts in ocean surface, glaciers and Earth's surface

- DAEDALUS

- In-situ instruments and nano-satellites to quantify energy deposited in the upper atmosphere

UK Proposed Earth Watch Mission



1. Initial Mission List

- 34 EO Missions proposed to EOMCR

2. Down select by UKSA Panel

- Purpose: EO operational, commercial missions not suitable as Earth Watch
- Timing: mission can be ready when needed
- Size: fit to the cost profile and delivery timeframe
- Risk: low risk mission (SRL/TRL/MRL at least 3)

3. CEOI funded Mission Studies

- Five 4-month mission studies (£36 K each)
- Mission definition and business case development

4. Final Mission Selection

- Interim outputs from studies used to assess mission suitability
- TRUTHS mission selected, based on best fit to Earth Watch criteria:
 - **Space-based Climate and Calibration Observatory**
 - **Traceable Radiometry Underpinning Terrestrial- and Helio- Studies**

5. Proposal to ESA CMin 2019

- In progress

CEOI Funding of TRUTHS
critical technologies

EO Technology Strategy
implementation

ESA Ministerial 2019

EO Programme Proposals



Programme Line	M€	Timescale
Future EO-1 (~EOEP6)	650	2020-25
Copernicus CSC-4	1402	2020-28
InCubed+	150	2020-24
Global Development	50	2020-24
Altius Earth Watch	55	2020-24
TRUTHS Earth Watch	42	2020-22
Total	2,349	