



# Artificial Intelligence and Earth Observation



## Tom Jones

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**Tom Jones** explains how moves are afoot to harness talents and technologies that will provide a fresh perspective on the greatest challenges of our time

The challenges facing humankind and our planet in the first half of the 21st Century are of a global scale and define themselves through unrivalled levels of interdependency and complexity. These challenges include migration (due to conflict, social and economic factors), biodiversity loss, water, food and energy disparities, climate change-driven natural disasters and stresses such as sea level rise and heatwaves. Many of these are captured within the UN Sustainable Development Goals<sup>1</sup>.

### Making an impact

While the challenges are global, their impacts are most acute, and need to be addressed, at a local level. Understanding the context and processes underlying these impacts is critical to making data-driven decisions and measured progress toward their mitigation.

Earth Observation (EO), from satellite to terrestrial imaging, already plays a key role in providing the primary contextual and process layer for this data-driven approach. Leveraging the full range of EO data sources offers information providers and policy makers an unrivalled degree of objectivity, legacy and spatial-temporal consistency in the generation of geospatial intelligence products.

The democratisation of space has led to an influx of EO data at an unprecedented rate and which, at a glance, would seem to offer immediate potential for these data sources to contribute an even greater role in deriving socio-economic and environmental insights. However, with this influx of data come various challenges,

namely the race to extract meaningful insights with sufficient speed and at sufficient scale to ensure that the data reach the hands of policy makers in time to take meaningful action. In short – we cannot process this data fast enough.

How can advancements in technology, already having brought about the democratisation of space, help us address these downstream data ‘abundance’ challenges? In an age of AI for ‘everything’ it would be insouciant not to explore the opportunity of exploiting AI4EO.

### UK uniquely positioned

Scarcity of annotated image datasets, shortages of skills, and ensuring geo-diversity are all challenges that must be overcome to meet the ambitious market shares envisaged by venture capital investors and consultancy firms alike. With world class AI research groups and leading EO and geospatial sector growth predictions,



Members of the FDL Europe 2018 team.  
Photo: FDL Europe

the UK is uniquely positioned to overcome these blockers and gain an increased share of the global EO value add market. Recognising this opportunity, the Satellite Applications Catapult undertakes numerous strategic initiatives to accelerate UK adoption and development of AI techniques for addressing EO applications.

A recent example is this year’s inception of the 2018 Frontier Development Lab (FDL) Europe<sup>2</sup>. This partnership between the Satellite Applications Catapult, Oxford University, NVIDIA and ESA Phi Lab<sup>3</sup>, is twinned with the NASA FDL in the U.S. The initiative has brought together world-leading AI researchers and EO domain specialists to address EO space-related challenges for the benefit of all humankind.

A critical aspect of FDL’s proven innovation methodology is the formation of interdisciplinary teams that tackle specific challenges. Each team is composed of at least two subject specialists from the space sciences and two specialists from the data sciences. This structure enables effective knowledge exchange and domain-focused implementation of AI techniques.

### Unsurprising success

Outputs of the 2018 challenges - Informal Settlement Detection and Disaster Response - can be found on the FDL Europe website. An unsurprising success, the technical findings of this year’s programme are being published in leading AI and EO research journals and the teams are pursuing discussions with various organisations, such as UNICEF, to operationalise the various approaches. The latter were proven against real-world user cases within the eight-week accelerator.

While the adoption of AI-driven analytics is only one of the developments needed to gain a unique perspective on the greatest challenges facing our planet, it is an essential enabler, nevertheless, if we are to overcome the EO data abundance challenge.

- <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- <https://fdleurope.org/>
- <http://blogs.esa.int/philab/>