

## **UK Technologies Developed to Measure Air Quality From Space**

The Earth's atmosphere is a mixture of gases dominated by oxygen and nitrogen. Other gases are present in small quantities, but some of these, including carbon dioxide contribute to dangerous climate change, and others (e.g. nitrogen dioxide) are pollutants responsible for poor health and deaths around the world, including in the UK. According to a World Bank report from 2016 "air pollution prematurely kills 5.5 million people a year, or one in ten deaths worldwide" and cost the global economy 5.1 trillion USD annually.

It is therefore essential to measure which gases are present in the atmosphere, how much of each is present, and if possible, the source of the emission so that suitable mitigation strategies can be deployed. All of the pollutants and greenhouse gases leave a unique 'fingerprint' on the spectrum of light (visible, infrared and microwave) passing through the atmosphere, and this is detectable by instruments known as spectrometers. For local effects we can use ground or aircraft based instrumentation, but for a truly global picture, we must use spacecraft to look down at the Earth's atmosphere.

At a recent Centre for Earth Observation Instrumentation (CEOI) Emerging Technologies conference in Abingdon, Oxfordshire, we heard from teams from universities and industry that are collaborating under CEOI funding to develop very high performance miniature instrumentation to measure and quantify the various atmospheric constituents. The instruments are aimed at space deployment, but can also be used on aircraft or even in industrial applications on the ground. The sensitivity allows detection at only a few parts per million, and the small size allows the instruments to be used on the new generation of small, and therefore lower cost, spacecraft. While it takes years to bring new technologies from the laboratory to readiness for spaceflight, the CEOI has funded several instruments which are now ready to go into space, and we look forward to these UK developments contributing to the global efforts to monitor air quality, which will improve the health of humanity as well as the health of the global climate.

### **Note to Editors:**

The Centre for Earth Observation Instrumentation is funded by the UK Space Agency to advance the development of innovative instrumentation technologies for Earth observation and to maintain the UK position as a world-leader in Earth observation satellite technology.

The CEOI held its biannual Emerging Technologies Challenge Workshop (ETCW) in Abingdon, Oxfordshire in May 2017. The workshop discussed technologies arising from new and ongoing CEOI project work and exposed emerging instrumentation concepts to the science community, also examining opportunities for wider applications of emerging EO technology. Full details of the workshop are available at [ceoi.ac.uk/page-2/emerging-technologies-challenge-workshop/](http://ceoi.ac.uk/page-2/emerging-technologies-challenge-workshop/)

The CEOI was created in 2007 with the aim to develop key capabilities through the teaming of scientists and industrialists. The CEOI is a partnership led by Airbus DS together with the University of Leicester, STFC Rutherford Appleton Laboratory and QinetiQ.

Further Information is available at [ceoi.ac.uk](http://ceoi.ac.uk) or from the CEOI Director:

Mick Johnson

c/o Airbus DS Ltd, Gunnels Wood Road, Stevenage, SG1 2AS, UK

Email: [mick.johnson@airbus.com](mailto:mick.johnson@airbus.com)

Tel: +44 (0)1438 774421