

OmniSat-HAPI NSTP Flagship

ThalesAlenia
a Thales / Leonardo company Space



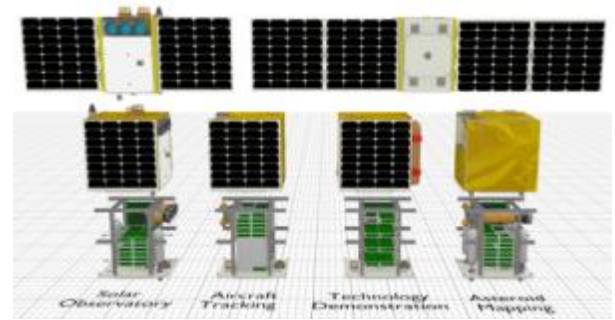
STFC
UK Astronomy Technology Centre

OmniSat & HAPI Instrument Background

- High-resolution Anthropogenic Pollution Imager (HAPI) on an OmniSat platform
- Small (50kg class) satellite and EO instrument combination for NO2 measurement at high resolution and high revisit frequency
- Outcome of ESA feasibility studies and CDF Review
- Current Flagship project to develop a demonstration instrument

OmniSat platform

- Modular
- Flexible
- Capable
- Reliable
- 120 m/s delta-V
- 400km – 1000km
- 30-50kg

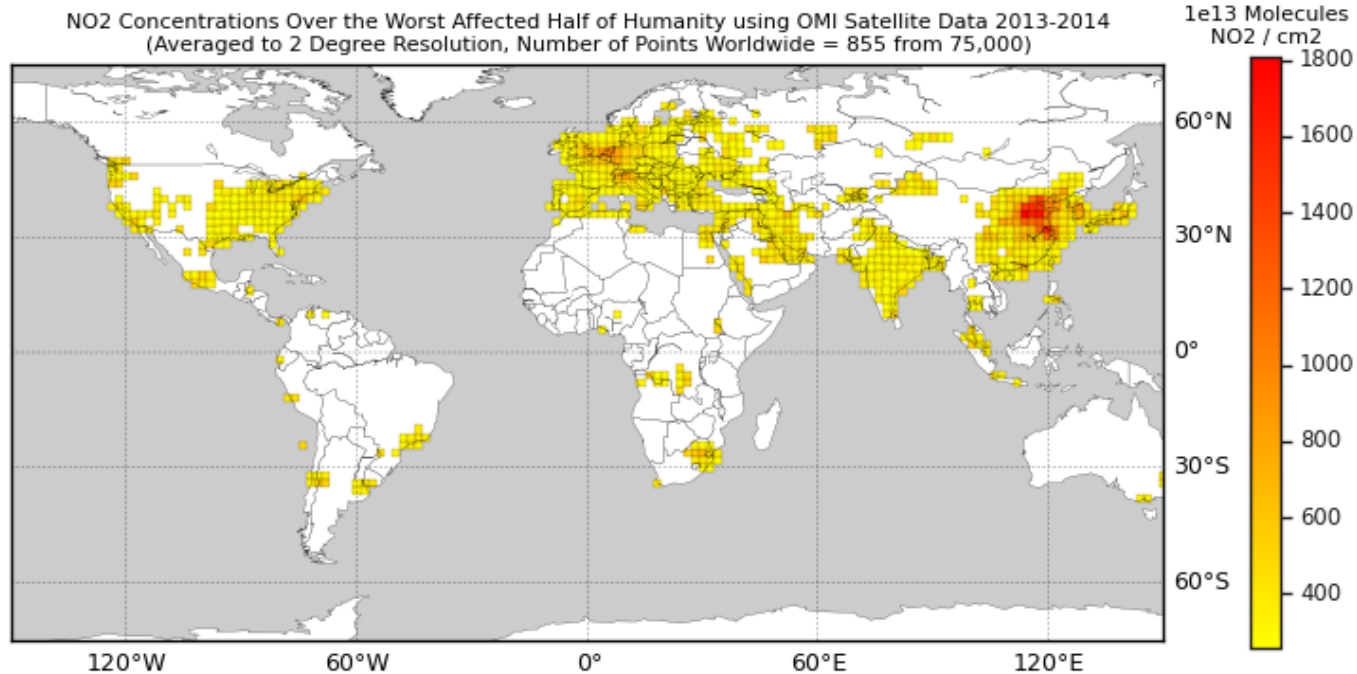


- Power
 - 11W average
 - 60 W peak
- Volume 32 litres
- 4 year lifetime
- Three- axis stabilisation
- S-band uplink
- X-band downlink

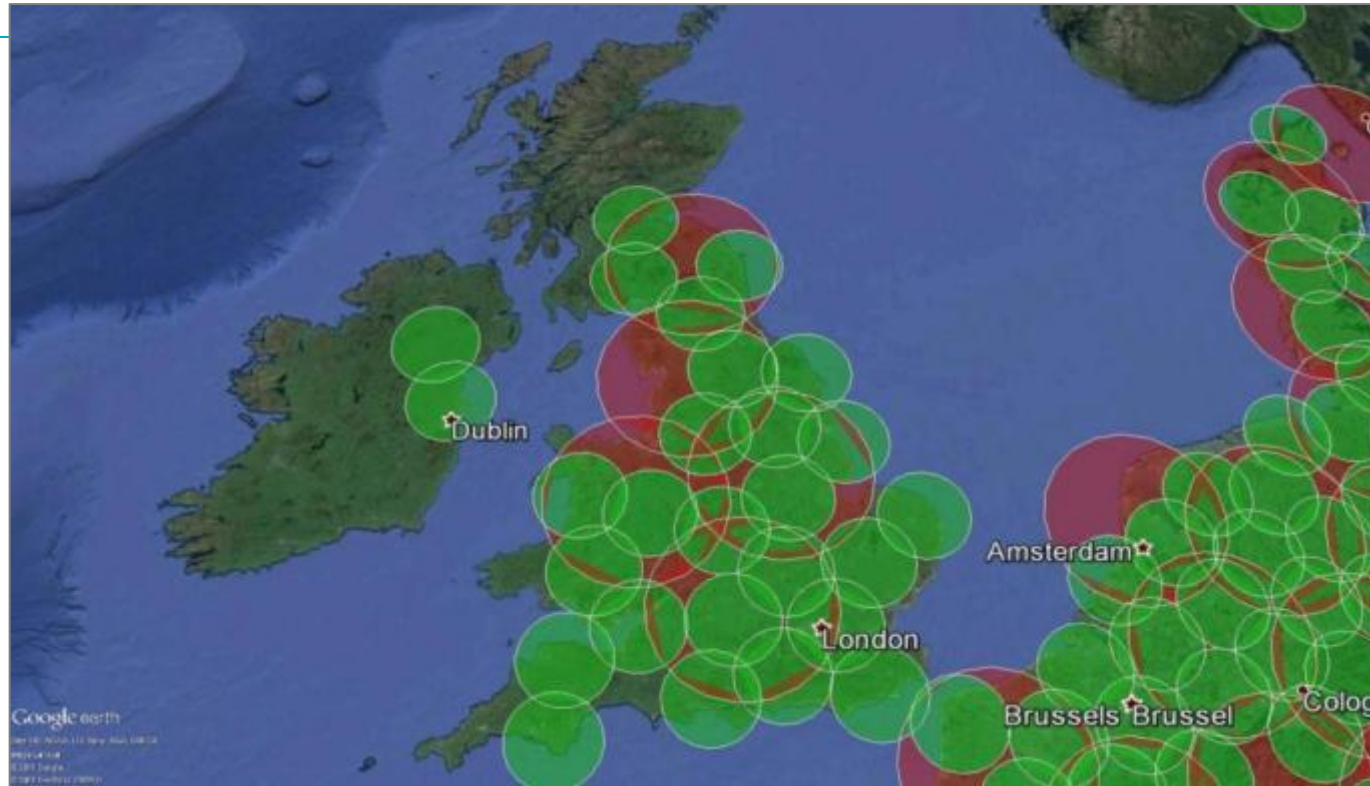
Locating NO₂ Emission Hotspots

- NO₂ concentrations over the most polluted half of humanity.
- 2.27% of the Earth's total surface.

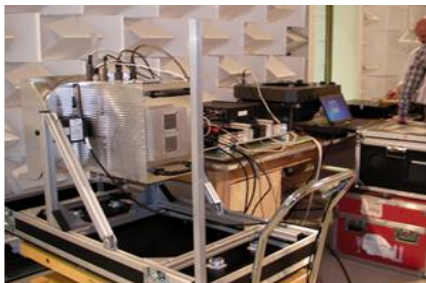
NO₂ Concentrations Over the Worst Affected Half of Humanity using OMI Satellite Data 2013-2014
(Averaged to 2 Degree Resolution, Number of Points Worldwide = 855 from 75,000)



Modelling – Global targets mapped over UK



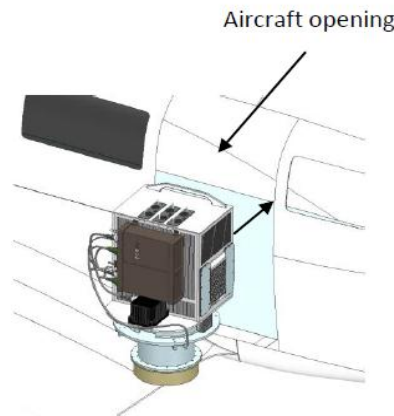
Fixed Wing Airborne Demo Flight



- Lab testing
- Instrument installed in aircraft



- Unpressurised aircraft (Britten-Norman BN-2A Islander) with survey hatch

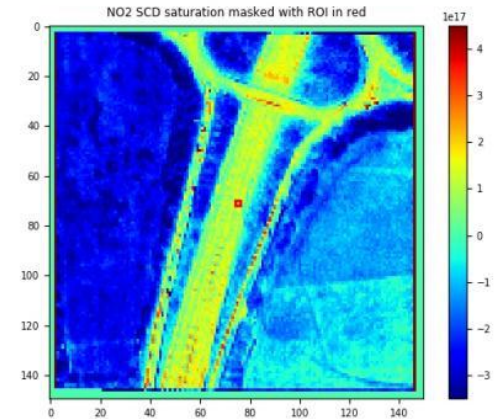
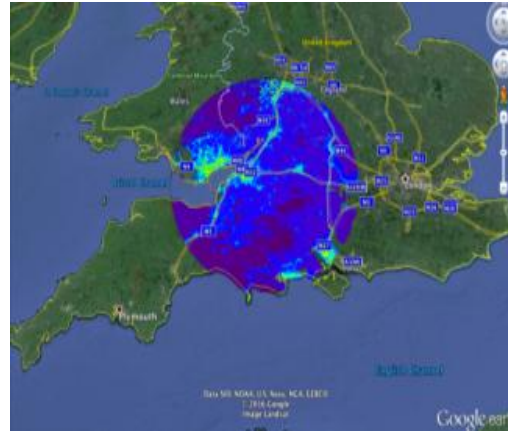
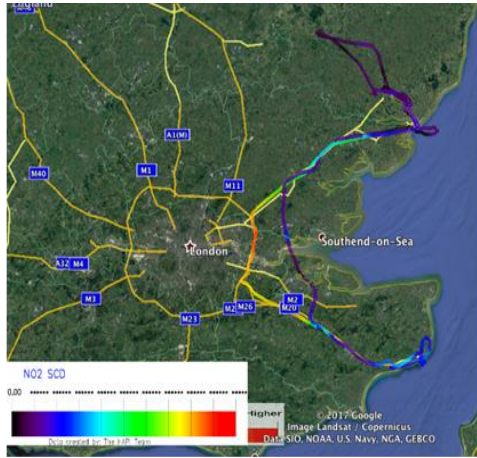


AOIs in Leicester

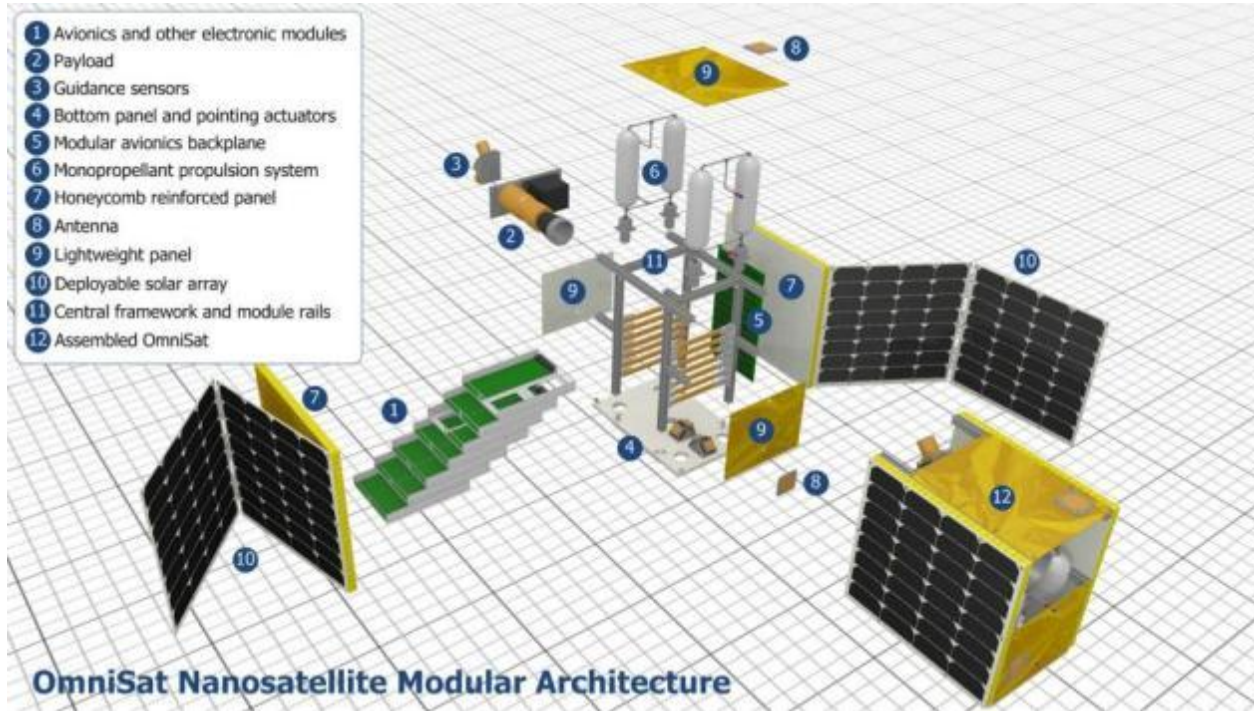
- Several locations are already of known interest
- It is expected more hotspots will be found in the data



QDOAS Analysis of the Flight Path / Baseline Scenario Retrieval Analysis and Retrieval Analysis - A12 Junction



Future – Flight Instrument and Modular small (50kg) satellite



Future - Constellation Design Concept

Full operational constellation

- 24 OmniSats
- 8 OmniSats per plane
- 3 planes in SSO (10AM, 12PM and 2PM)
- 600m spatial resolution
- 200km swath
- 600km orbit altitude
- E.g. Ksat lite Ground Station
- <2hr delay from capture to end user
- Data every 1.6 hours (average)

