



Science and
Technology
Facilities Council

www.ralspace.stfc.ac.uk/remotesensing



National Centre for
Earth Observation

NATURAL ENVIRONMENT RESEARCH COUNCIL

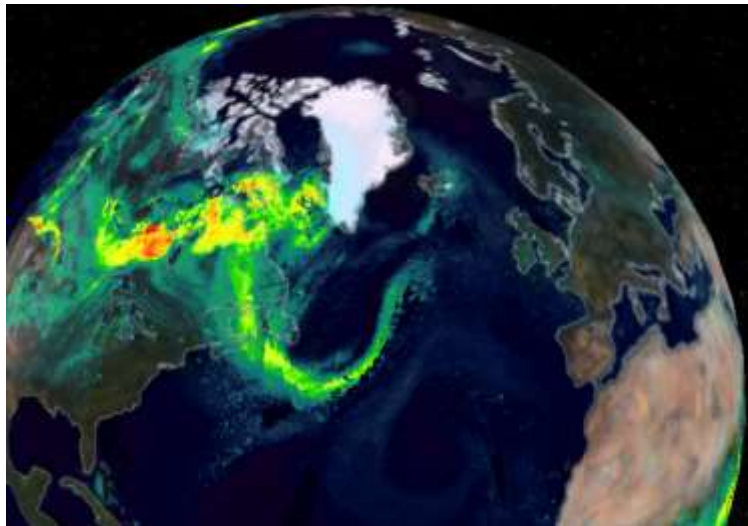
RAL Space

Remote Sensing Group

Production of Satellite Data on Atmospheric Trace Gases and Particulates



rsg.rl.ac.uk/vistool



- Distributions of trace gases, aerosol & clouds
- Multi-year climate datasets & near real time
 - NERC National Centre for Earth Observation (NCEO) & EO Climate Information Service (EOCIS)
 - ESA Climate Change Initiative



cci



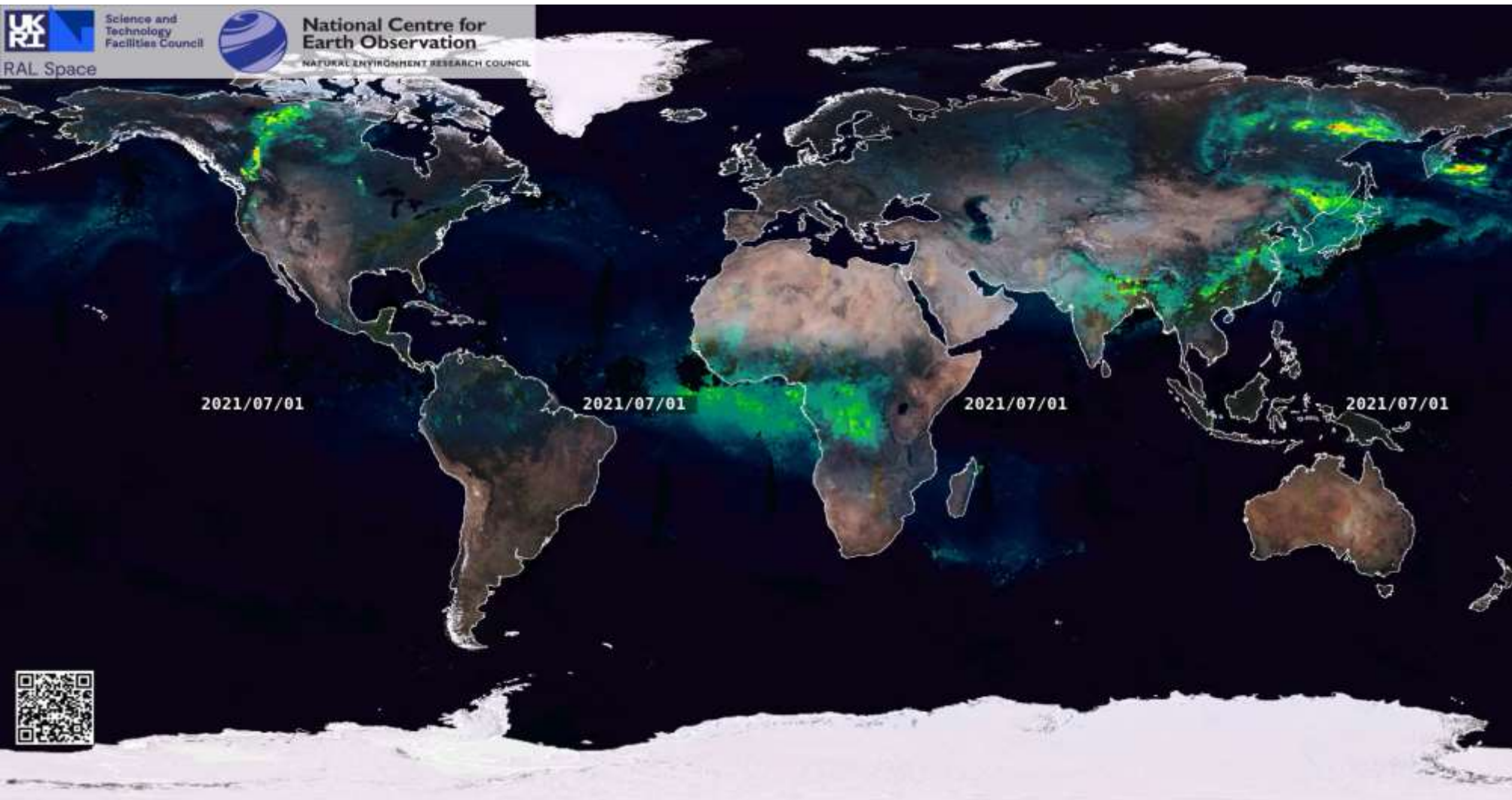
Copernicus



Centre for Environmental
Data Analysis
SCIENCE AND TECHNOLOGY FACILITIES COUNCIL
NATURAL ENVIRONMENT RESEARCH COUNCIL

JASMIN

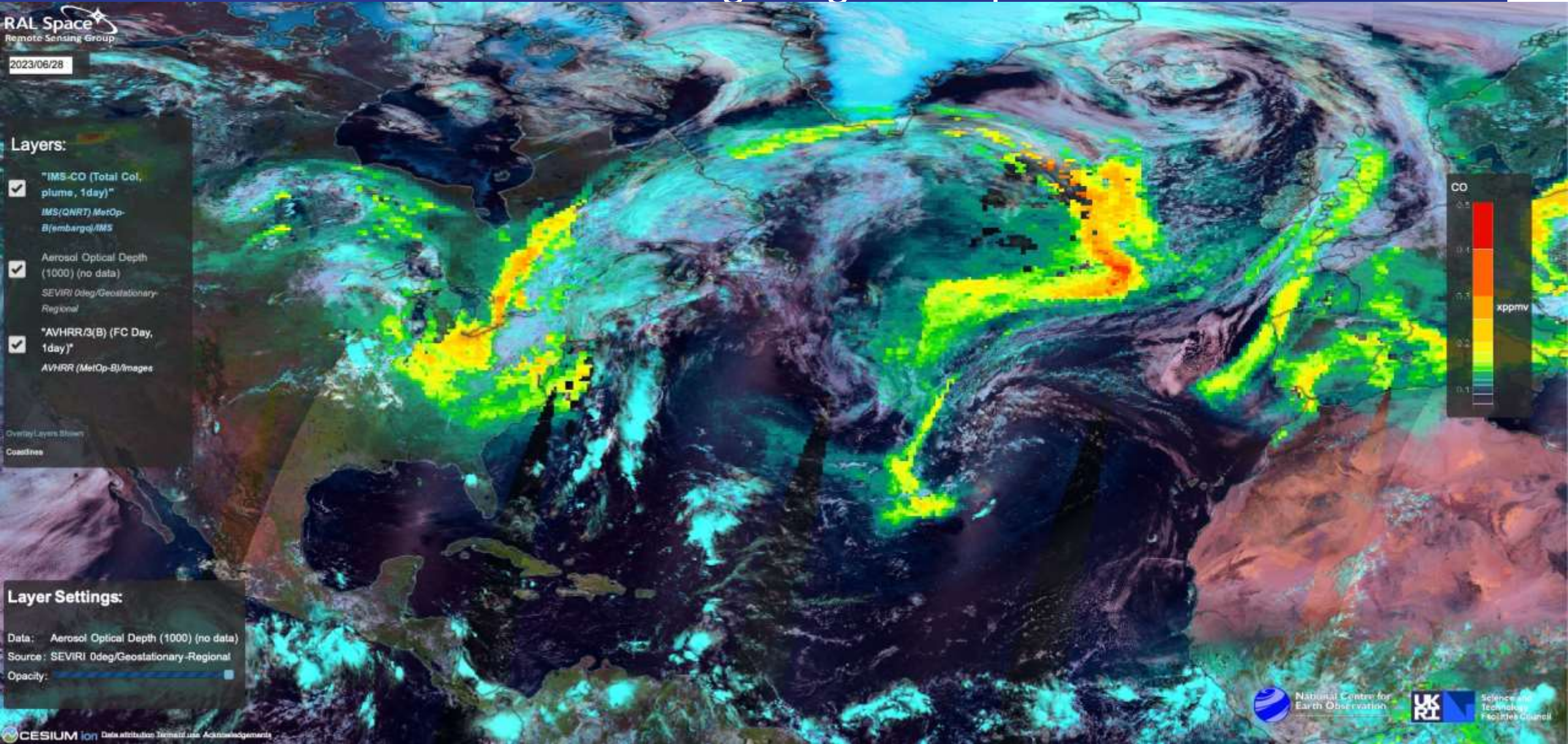
Carbon Monoxide from IR sounding N.Hemisphere Fires: July 2021



rsg.rl.ac.uk/vistool



2023 Canadian fires long range transport to UK



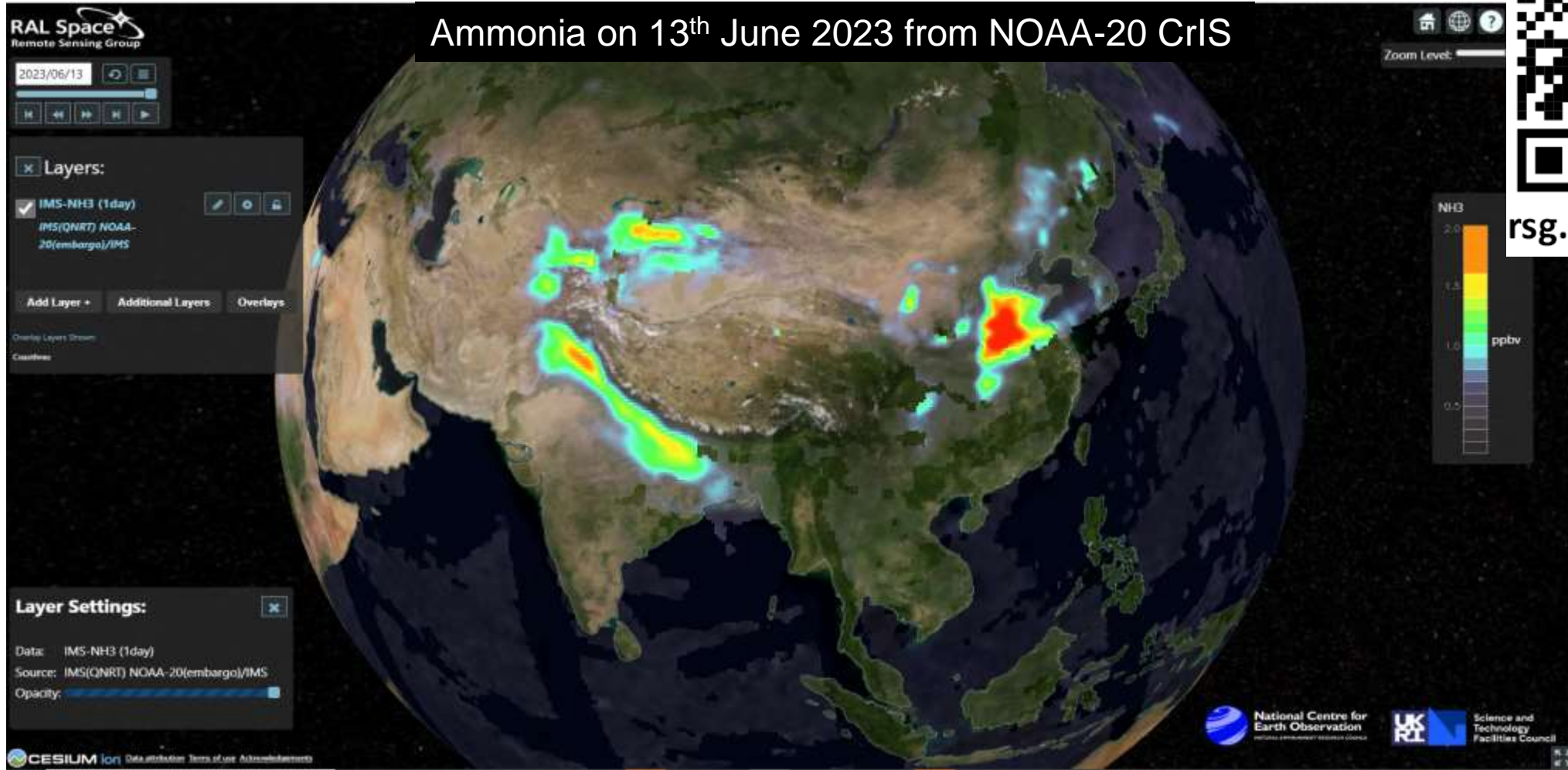
Ammonia Observation from Satellite

RAL Space

- RAL Space Remote-Sensing Group has scheme to retrieve ammonia from satellite infrared sounders.
- Multi-year data-sets produced from CrIS (2015-22) and IASI (2007-22)
- Running also in near-real time on Jasmin rsg.rl.ac.uk/vistool



rsg.rl.ac.uk/vistool



rsg.rl.ac.uk/vistool

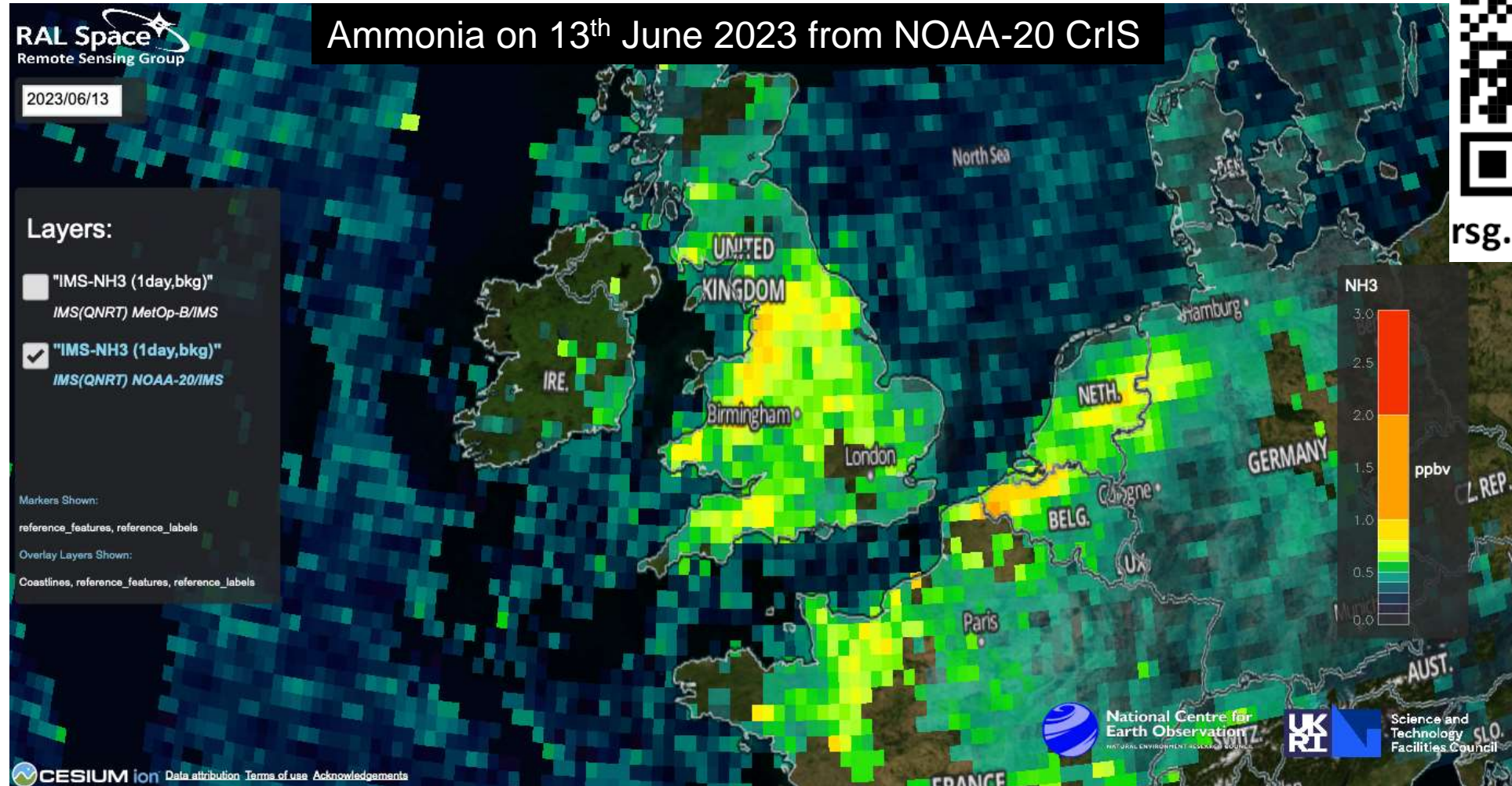
Ammonia Observation from Satellite

RAL Space

- RAL Space Remote-Sensing Group has scheme to retrieve ammonia from satellite infrared sounders.
- Multi-year data-sets produced from CrIS (2015-22) and IASI (2007-22)
- Running also in near-real time on Jasmin rsg.rl.ac.uk/vistool



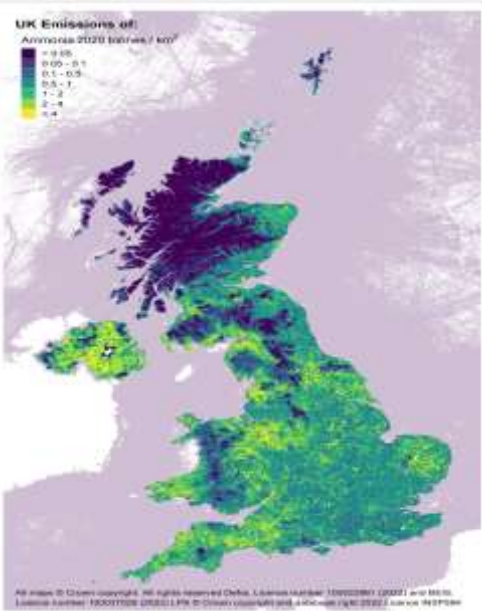
rsg.rl.ac.uk/vistool



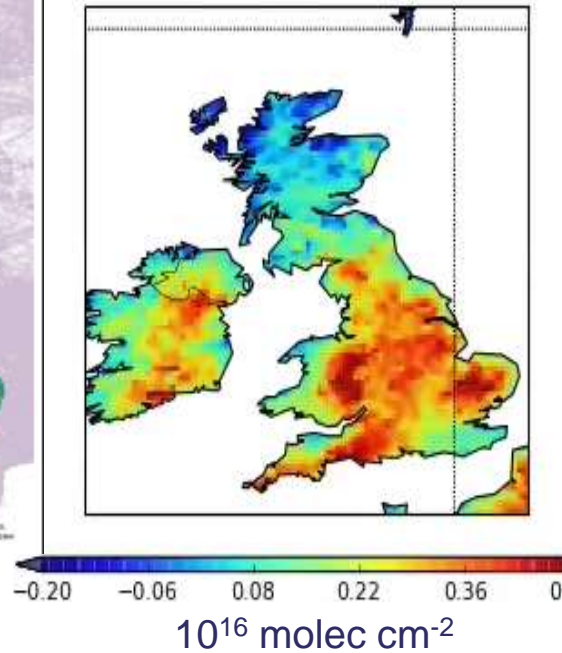
rsg.rl.ac.uk/vistool

- First comparison with CMAQ regional AQ model in Imperial SAQN project (A. Sheehan, poster)

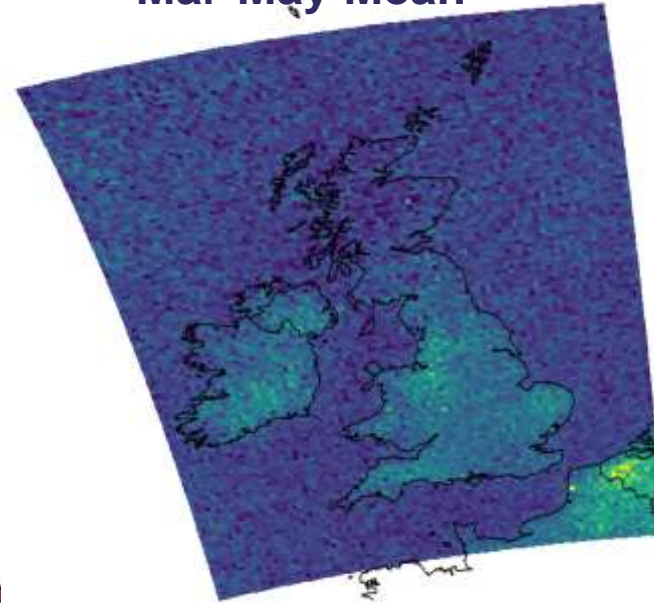
Defra NAEI NH₃ 2022



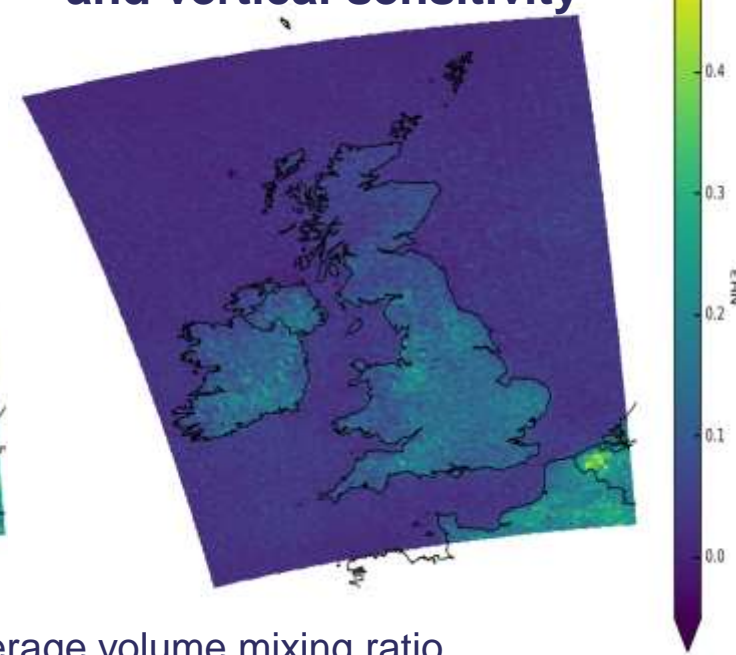
CrIS NH₃ 2015-20
Mar-May mean



CrIS NH₃ 2018
Mar-May Mean



CMAQ with satellite sampling
and vertical sensitivity

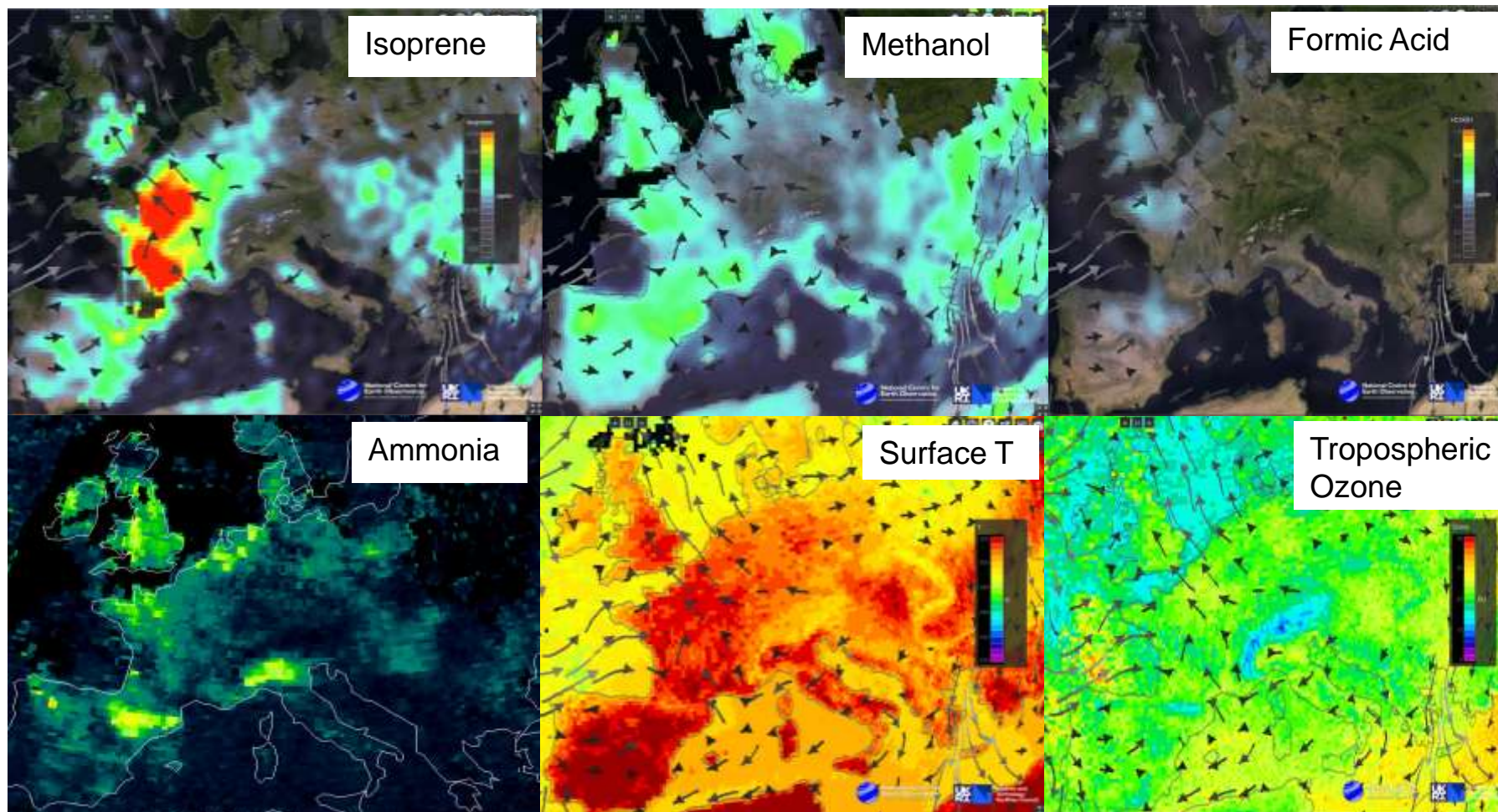


NH₃ column-average volume mixing ratio

- Improved retrieval scheme under development in UK's National Centre for Earth Observation (NCEO)
- Advanced capabilities of next generation operational satellites (2025-45) to be exploited:
 - MTG-S IRS: hourly observations ~4km resolution from geostationary orbit
 - MetOp-SG – IASI-NG: increased sensitivity globally from polar orbit



Volatile organic compounds in European heatwave: 17-19th July 2022



rsg.rl.ac.uk/vistool

VOCs due to wild fires and heat stress on vegetation detected by IR sounding over UK and Europe along with surface temperature and tropospheric ozone

<http://rsg.rl.ac.uk/vistool>

Summary and Future Work

- RAL Remote-Sensing Group retrieves pollutant distributions from satellite observations
 - Multi-year, global data sets produced for climate record (O_3 , H_2O , CH_4 , CO , NH_3 , CH_3OH , $HCOOH$, C_5H_8 , aerosol, volcanic SO_2 & H_2SO_4)
 - Near-real time processing system established with public visualisation tool <http://rsg.rl.ac.uk/vistool>
 - Events detected in NRT enable science studies eg Summer'18 & '22 European heatwaves, Australian fires 2019/20, Nordstream methane release 2022.
 - SAQN project on UK ammonia supported (see poster - *A.Sheehan, Imperial*)
- R&D in progress to improve and extend schemes to better serve AQ applications
 - Improve near-surface information (eg ML)
 - Exploit finer spatial & temporal resolution of new generation satellites to operate 2025-2045



rsg.rl.ac.uk/vistool