A new Remote Sensing Network for London Carbon Emissions

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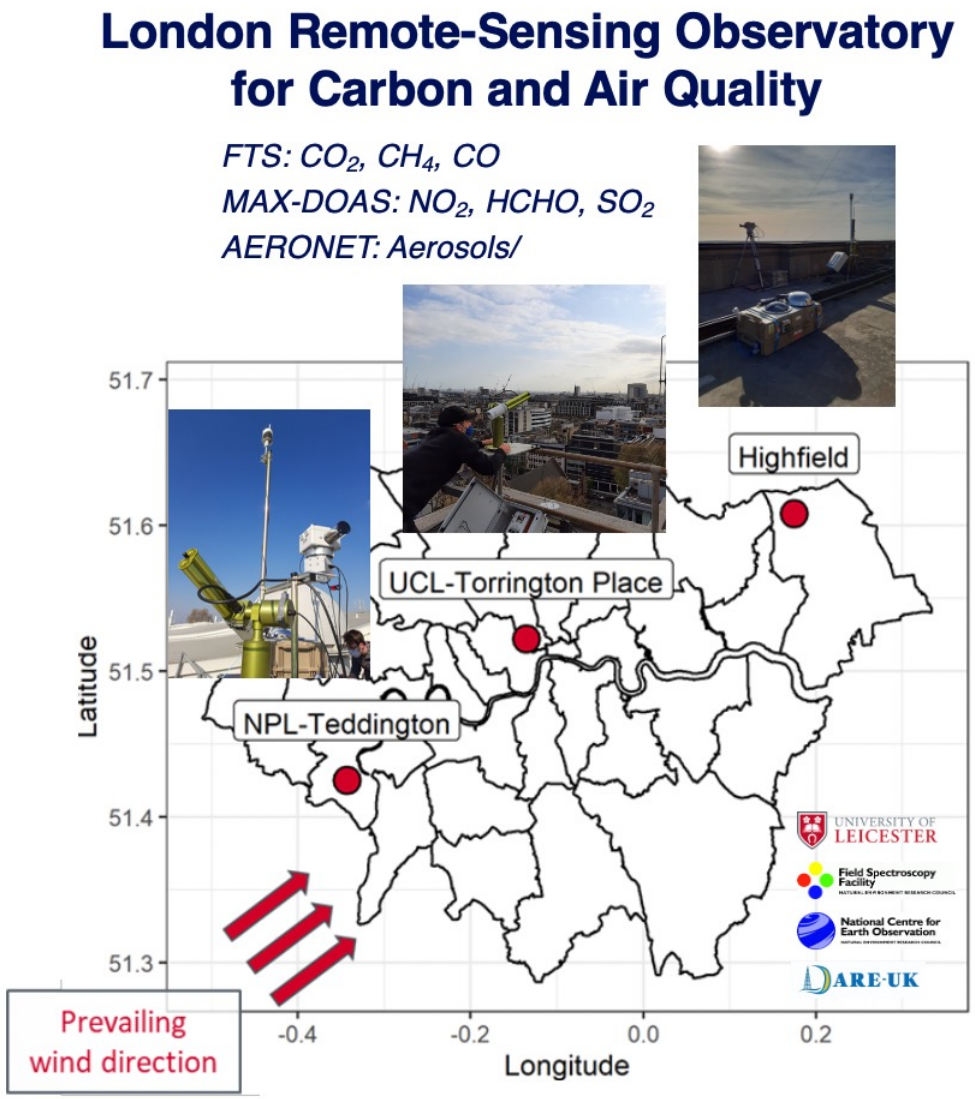
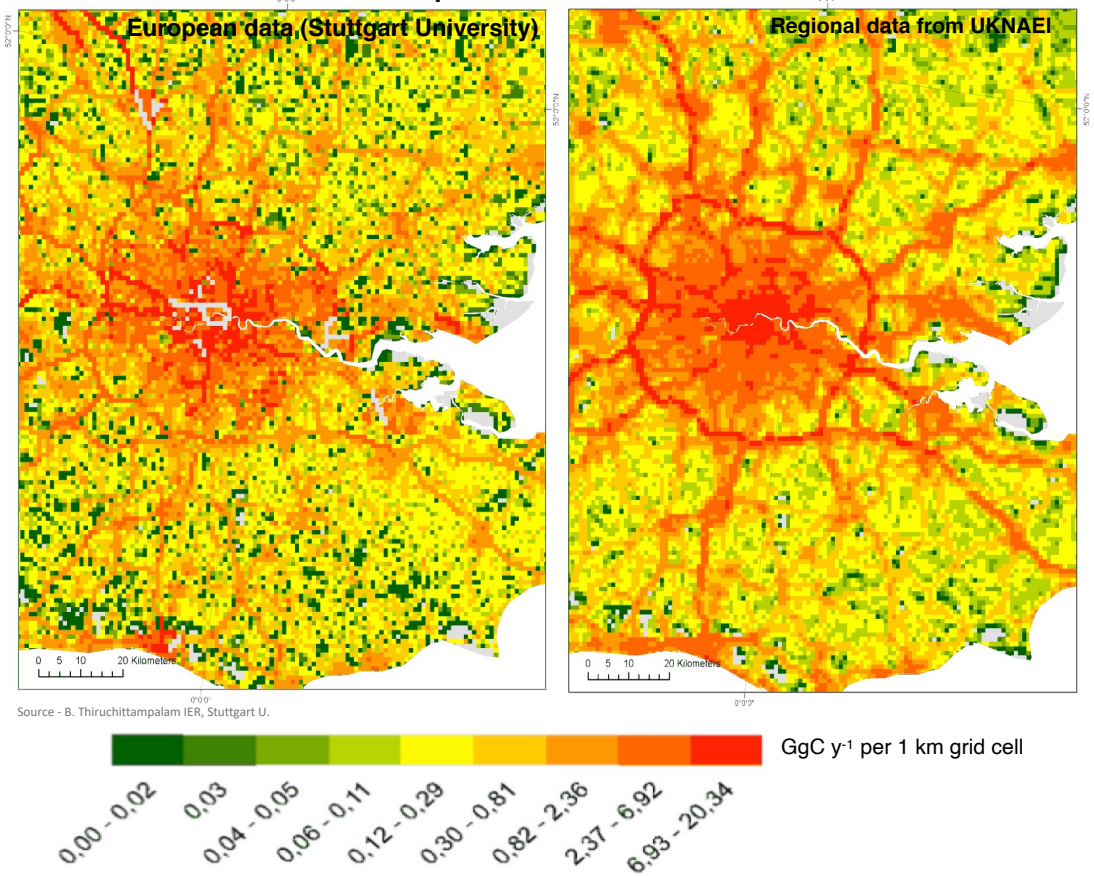
- Established a new remote sensing network in London for automatic and simultaneous observations of Greenhouse Gases, Air pollutants and Aerosols
- The goal is to critical evaluate the performance of satellites over cities and to joint exploit ground-based and satellite observations via Lagrangian Dispersion Modelling
- Network is fully operational and first data is now acquired and processed



Why Cities ?

- Cities and urban areas produce majority of carbon emissions
- Focus of political decisions made for climate mitigation with often ambitious targets (e.g. C40 cities, London net zero target by 2050)
- Cities represent important but not well understood component of regional carbon cycle with interlaced anthropogenic and biogenic fluxes, emission hotspots, lateral fluxes and a strong link to air quality and human behavior

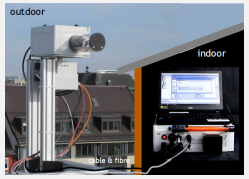
Road Transport Emissions for London

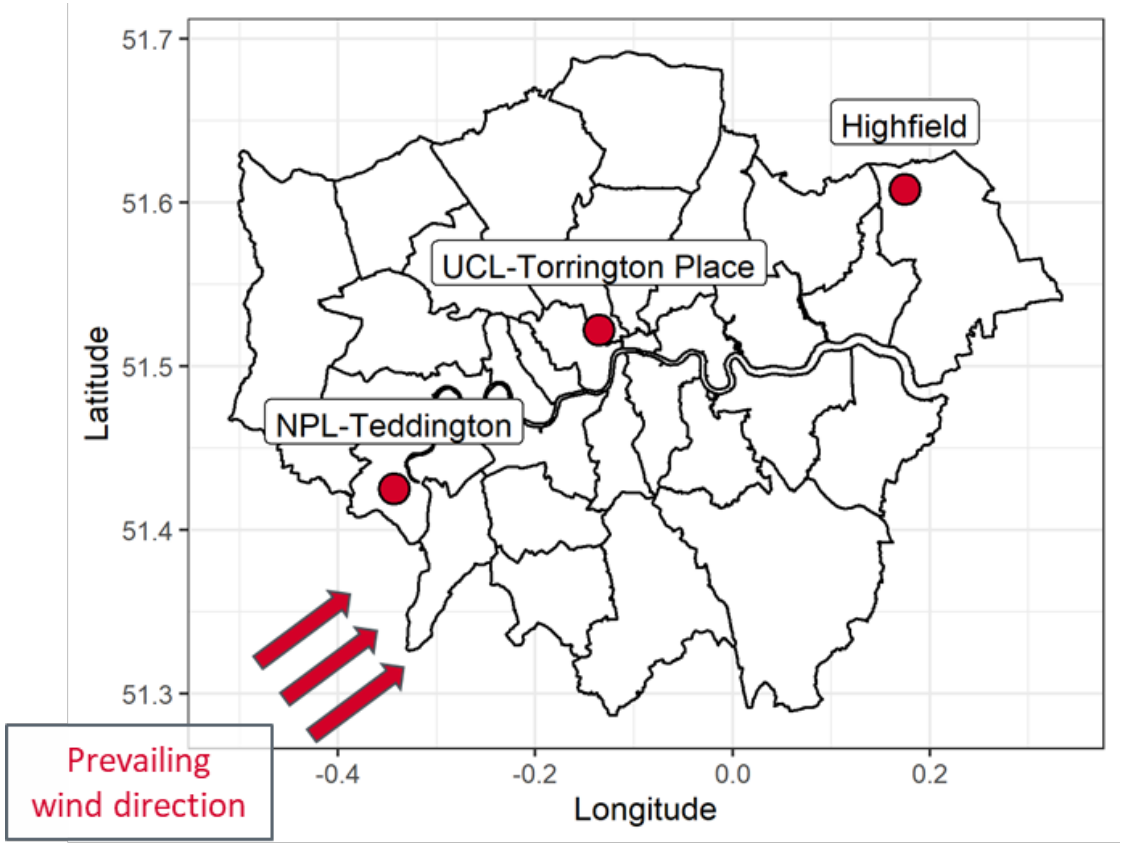


(Credit: P. Ciais, LSCE, CarbonSat presentation)

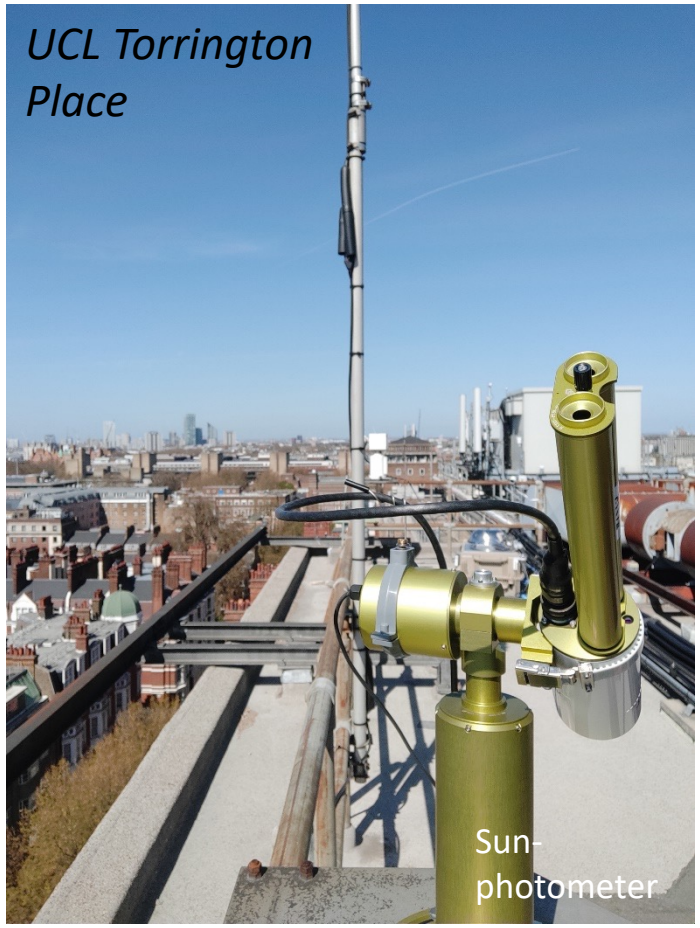
Ground-based remote sensing network in London

- New network with 3 sites across London along prevailing wind direction
- Instrument Suite for simultaneous observation of GHGs together with air pollutants and aerosols

Instrument	Species
Bruker EM27/SUN (COCCON) 	CO_2, CH_4, CO
Airyx MAX-DOAS 	NO_2, and other trace gases
Cimel Sunphotometer (Aeronet) 	Aerosols (AOD, Angstroem…)



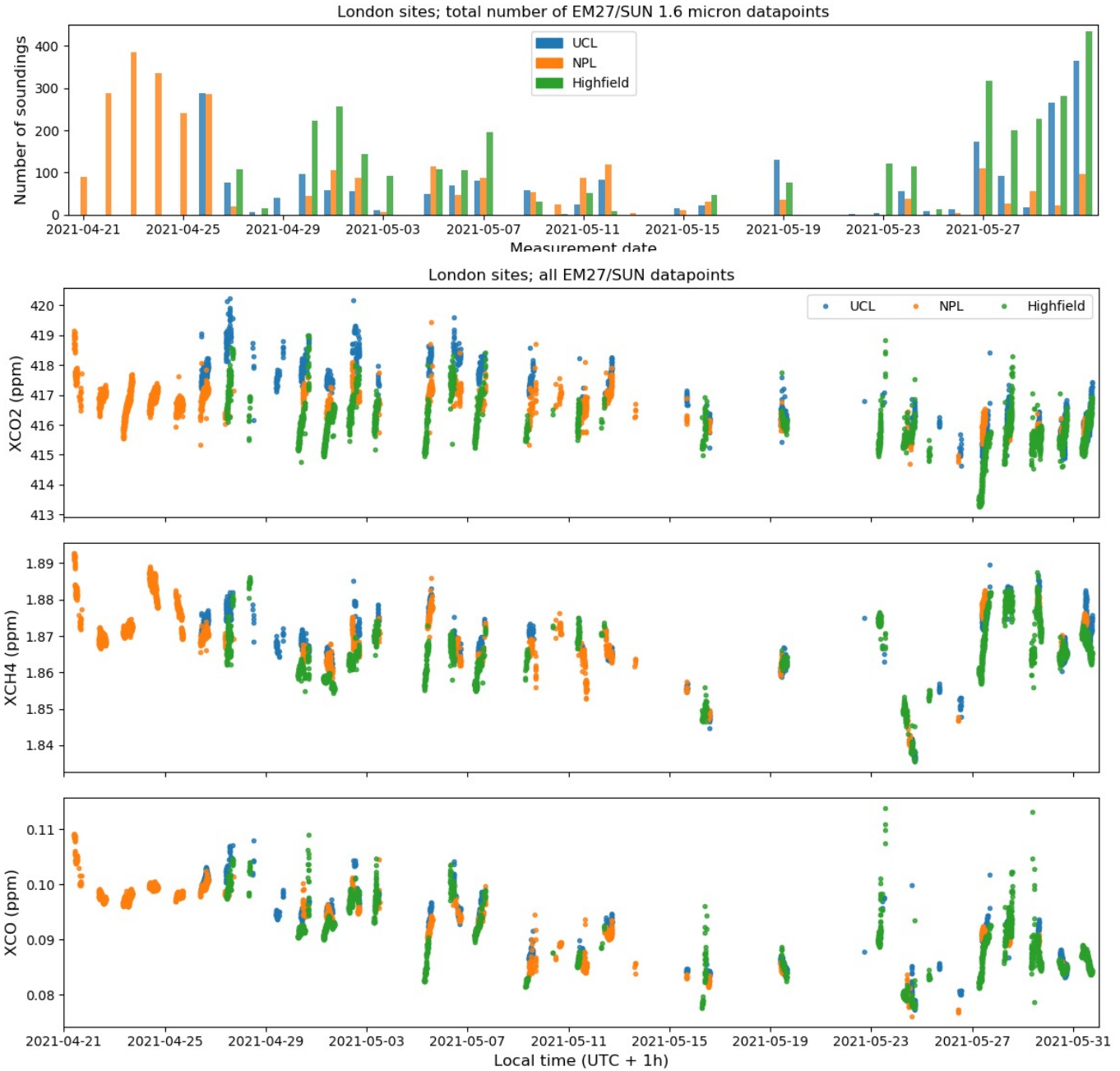
Network Site Locations



Site	Latitude	Longitude	Height above sea level
NPL Teddington	51.426 N	0.345 W	20 m
UCL Torrington Place	51.523 N	0.132 W	60 m
Highfield Tower	51.608 N	0.175 E	120 m

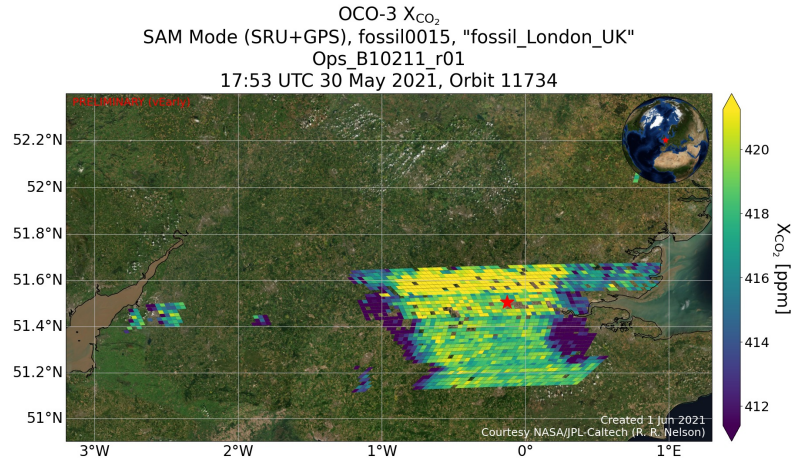
First look at EM27SUN Data

- All instruments are operational and measure routinely thanks to automatization and weather cover
- Good coverage even in cloudy periods
- Interpretation will be guided by meteorological data and transport modelling



Outlook

- Our network will initially operate for duration of 1 year
- Combined GHG + AQ dataset will be used to evaluate the performance of satellites over cities (OCO-2, OCO-3, GOSAT, TROPOMI)
  - Biases introduced by aerosols and covariance of NO_2 and CO_2
- Joint exploitation of ground-based and satellite observations via Lagrangian Dispersion Modelling
- Goal is to repeat London Network for future missions such as MicroCarb and Copernicus CO2M



NASA OCO-3

CNES/UKSA MicroCarb