Aircraft and landfill measurements during GAUGE so far – 2014

G. Allen, S. O'Shea, K. Bower, M. Le Breton, M.W. Gallagher, C. Percival, B. Jones, S. J. -B. Bauguitte, M. Cain, J. Pyle, E. G. Nisbet, D. Lowry, R. E. Fisher, J. L. France and more.

Photo: Jennifer Muller

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GAUGE Dataset

Parameter	Technique/Instrument	Operator	Detection limit (time resolution)
CO_2, CH_4	CRDS (Los Gatos FGGA)	FAAM & UMAN	~1.5 ppb (@1 Hz)
CH_4, N_2O	Aerodyne Quantum Cascade Laser Spectrometer	UMAN	~2 ppb (@1 Hz)
O_3	TEi49C, FAAM core	FAAM (core)	1 ppb (8s)
HCOOH, RCOOH HCN, HNO_3, Halides	Chemical Ionisation Mass Spectrometer	UMAN	~1 ppt @ 1Hz
CO, O_3, CH_4, C_2H_6, Temperature, H_2O (vertical profiles/partial columns)	ARIES FTIR	Met Office & UMAN	1-10% (relative concentration) @0.2 Hz
CO	Aerolaser AL5002 FAAM core	FAAM (core)	3ppb (1s)
T, P, q, winds	Dropsondes	FAAM (core)	0.3K, 0.1 mb, 0.1% RH (@1 Hz)

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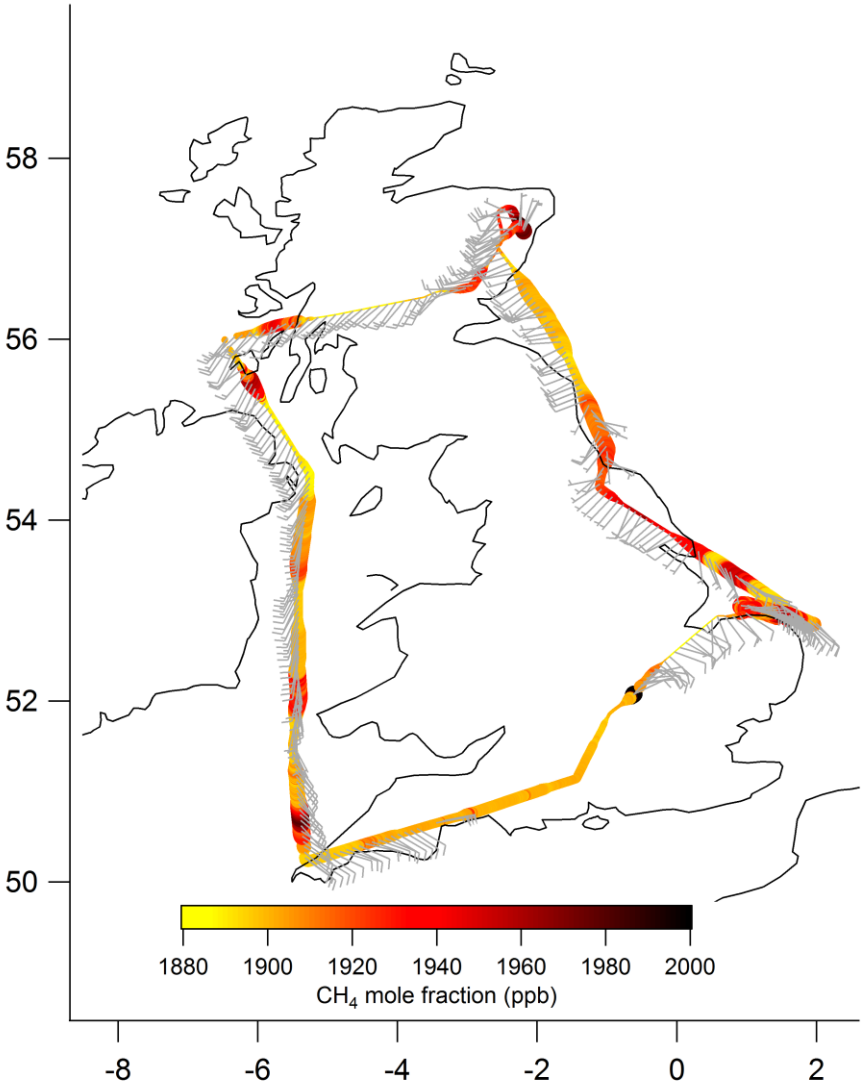

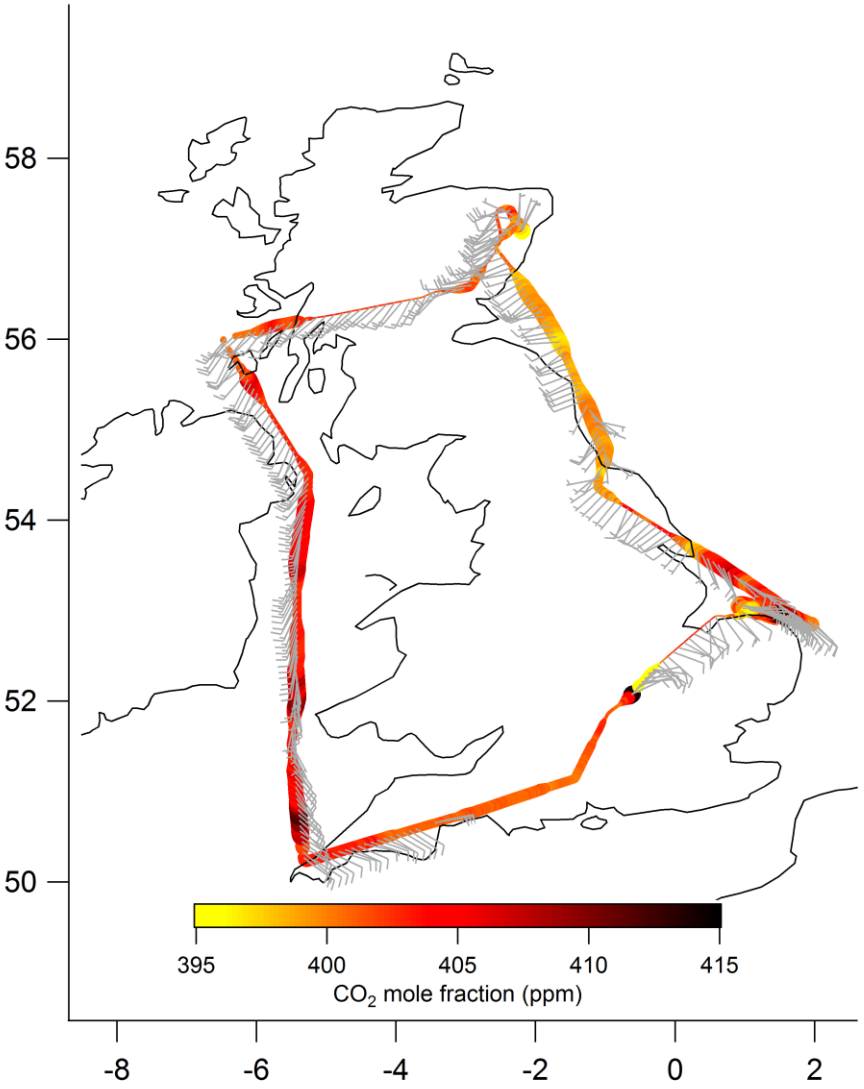

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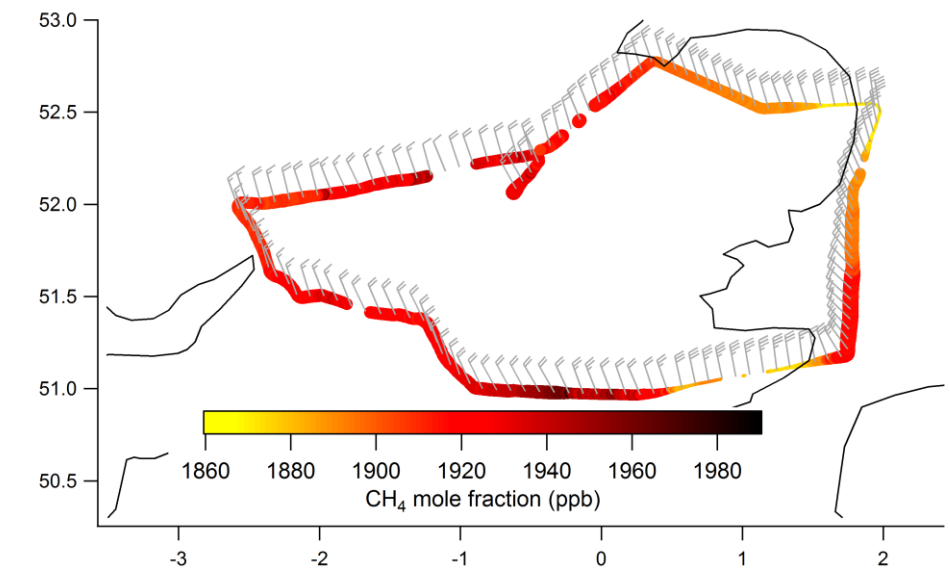

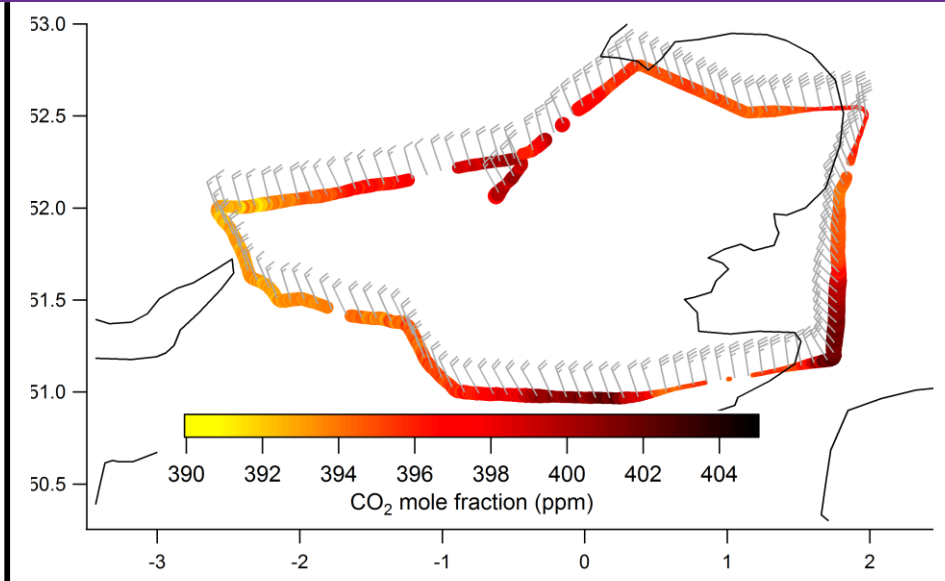

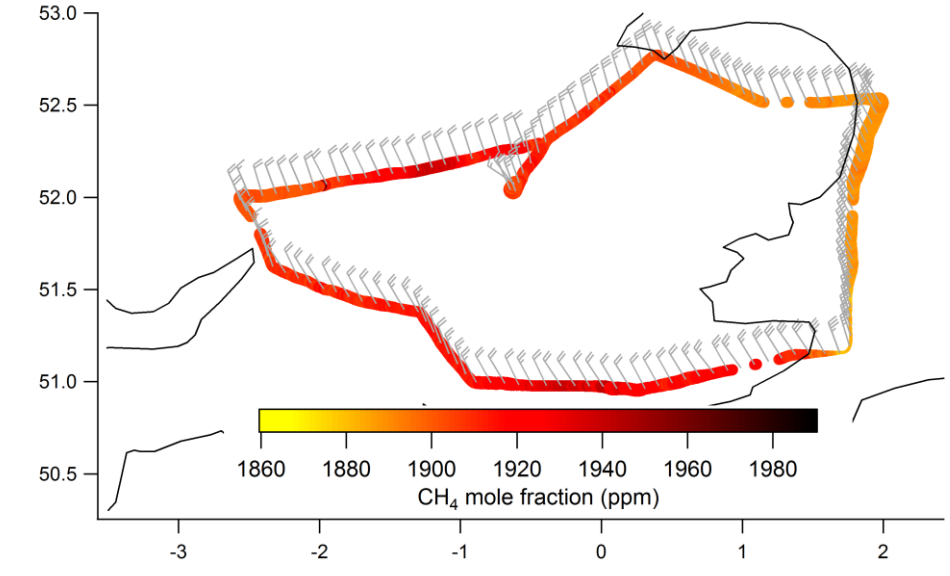

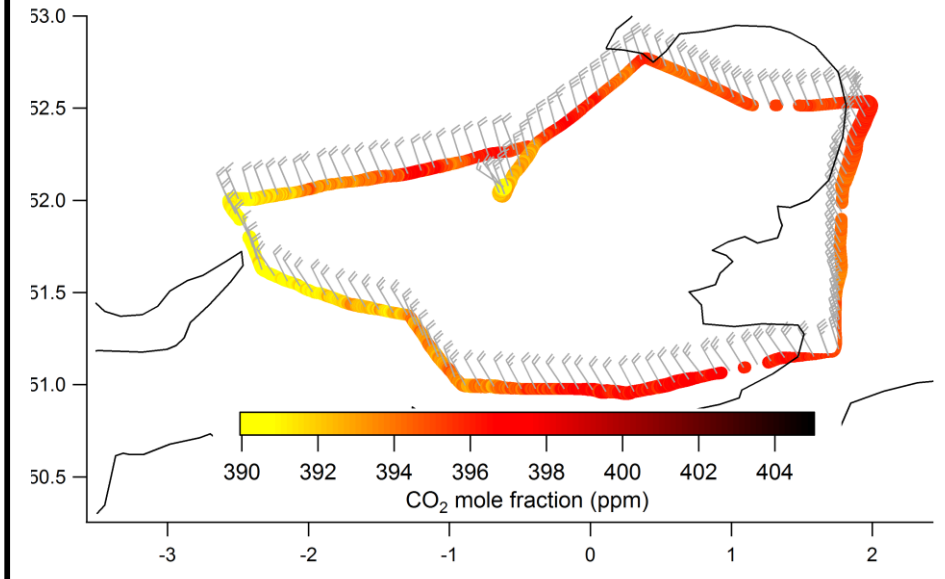

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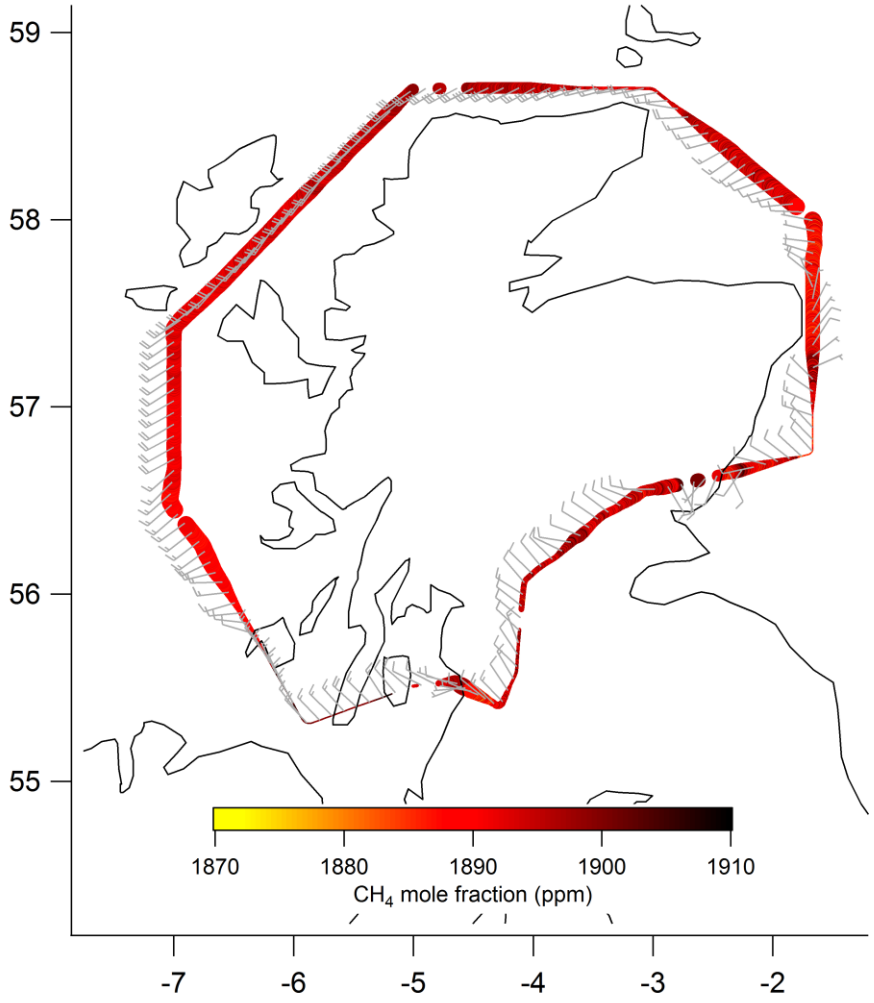

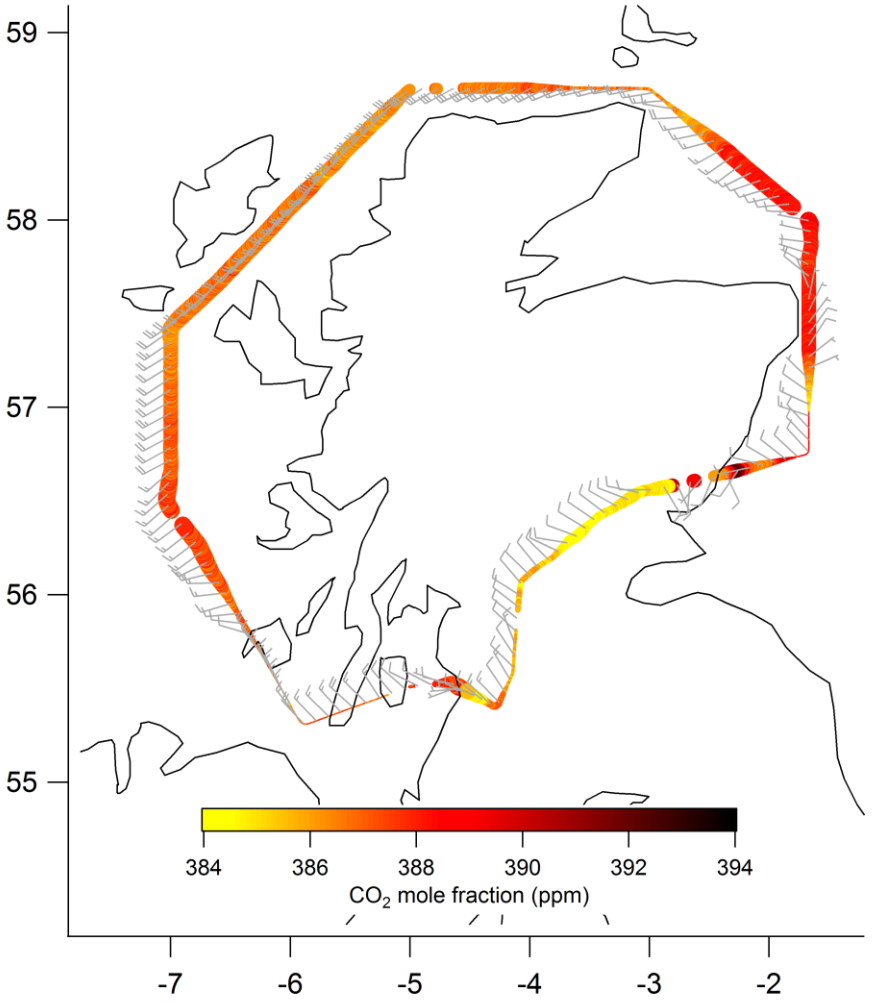

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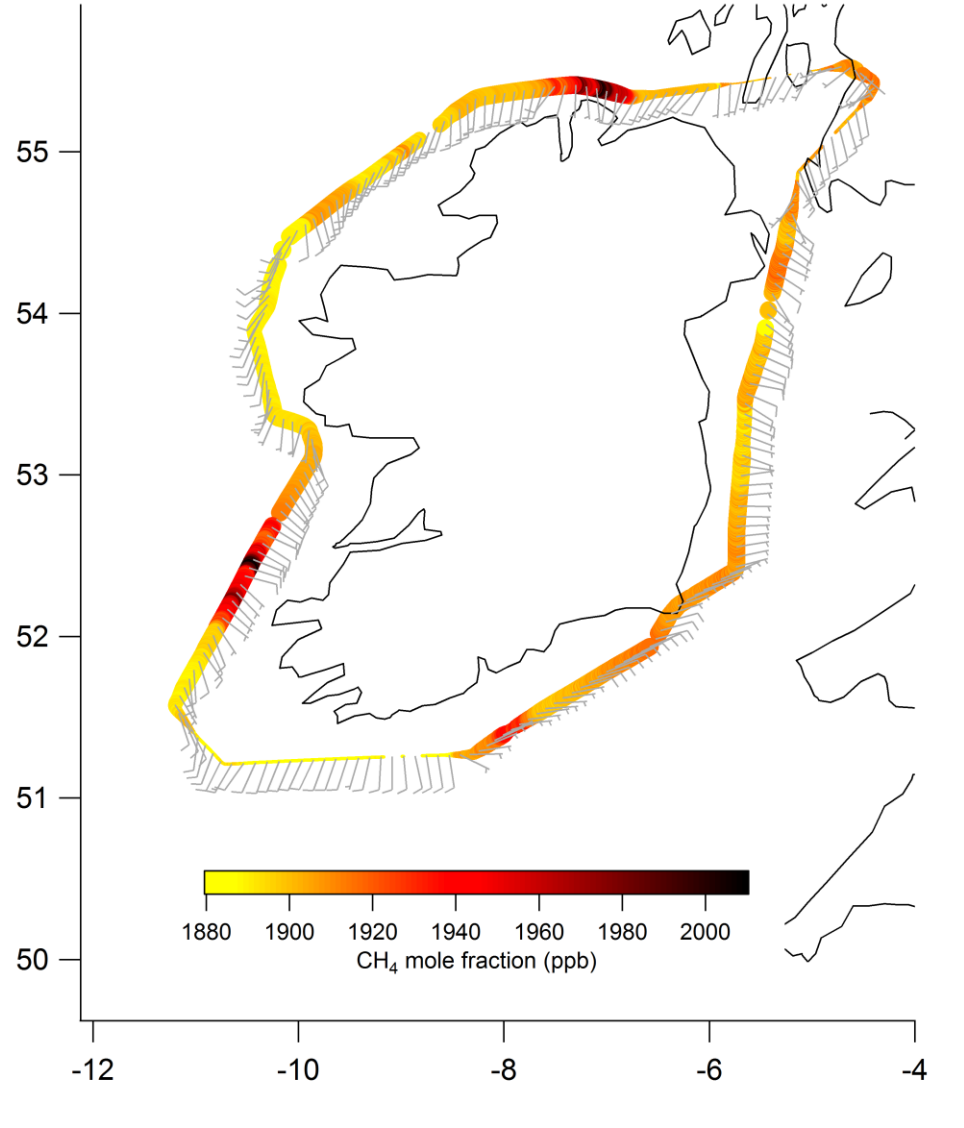

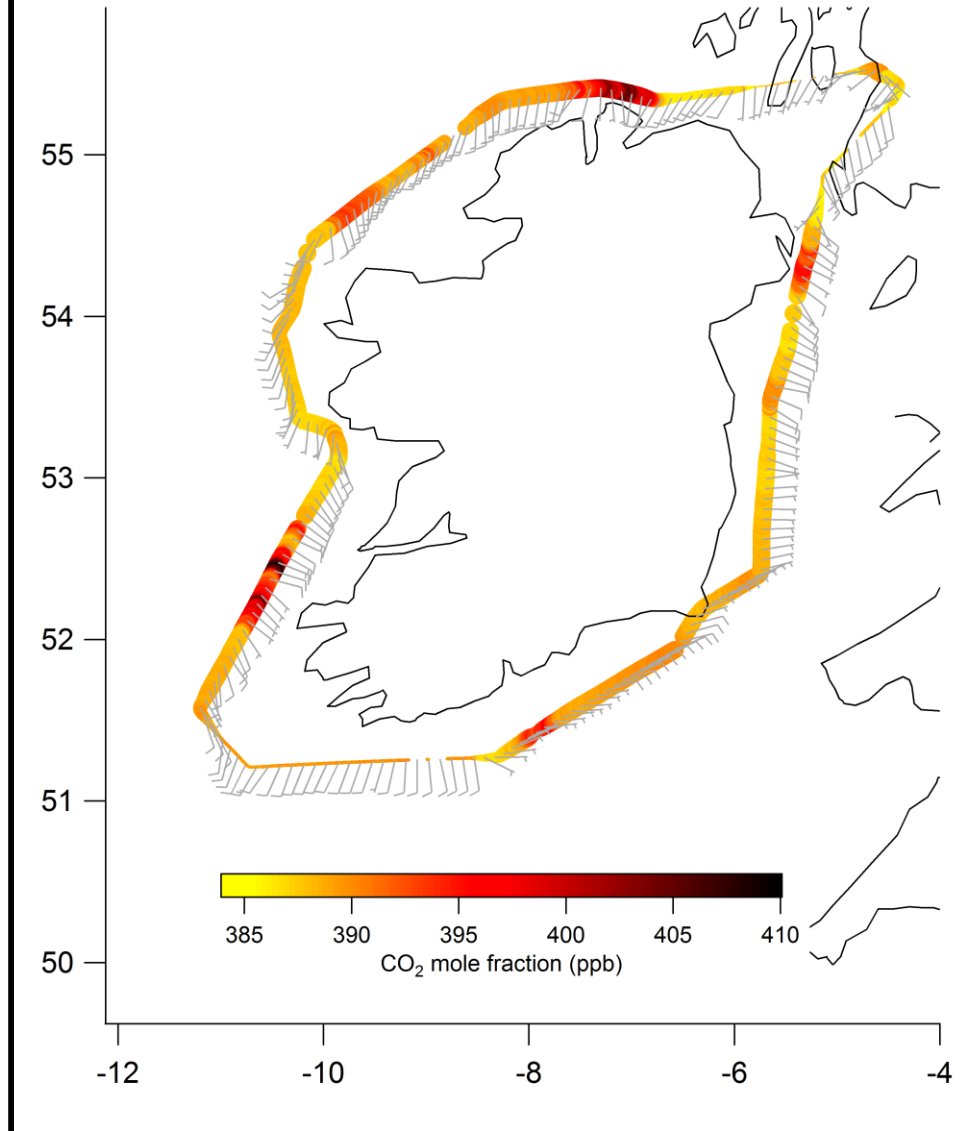

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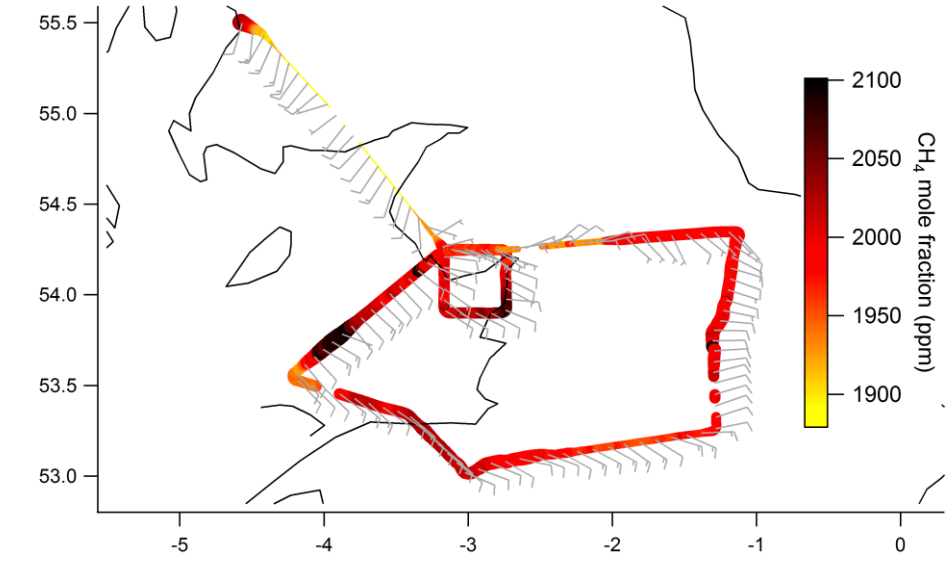

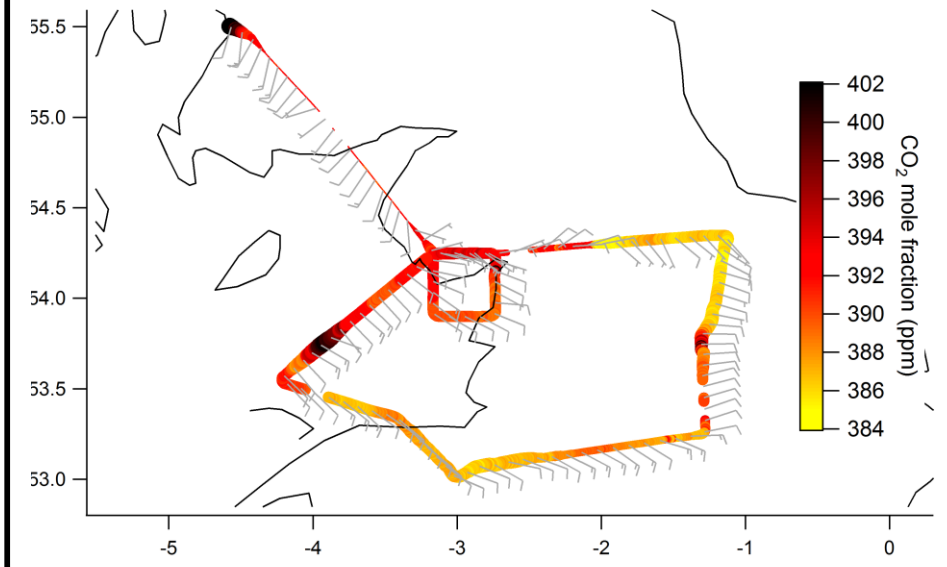

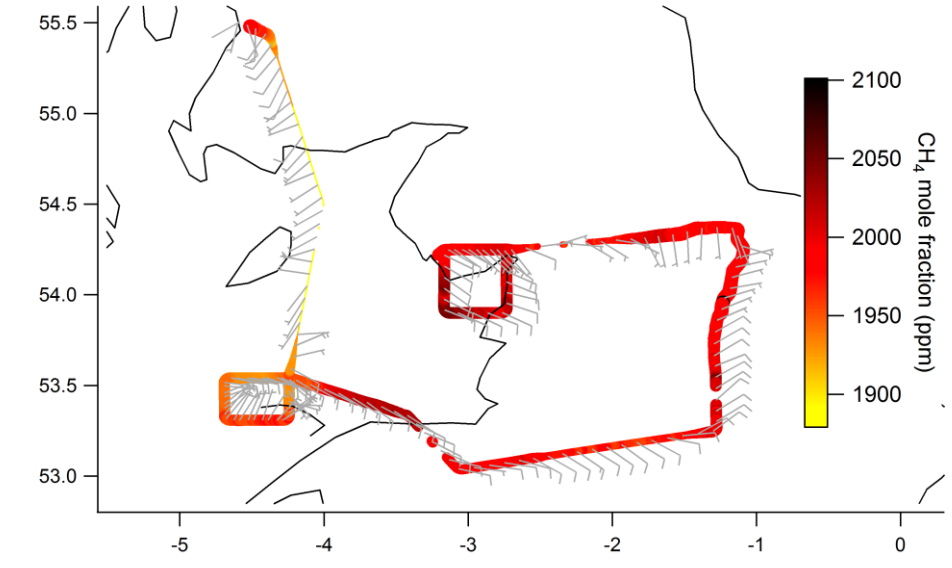

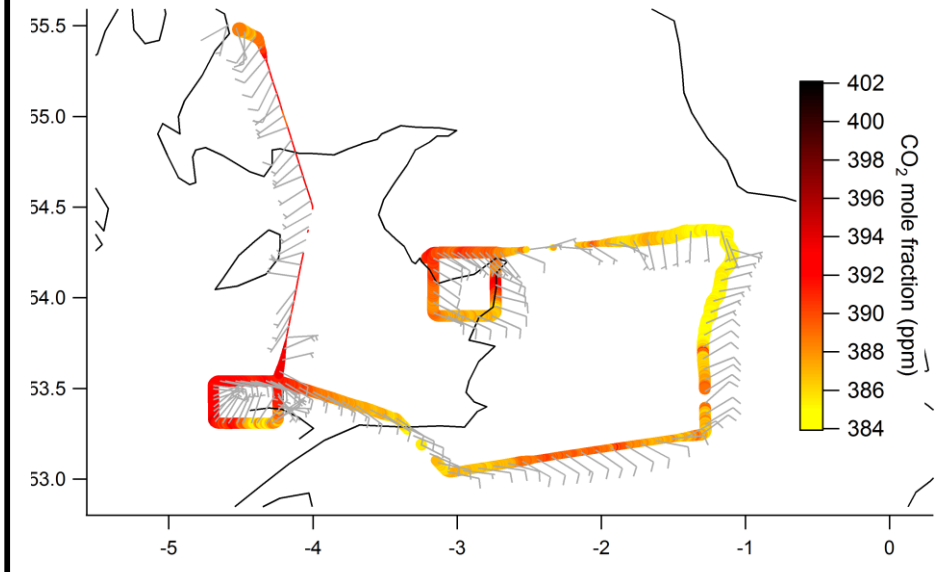

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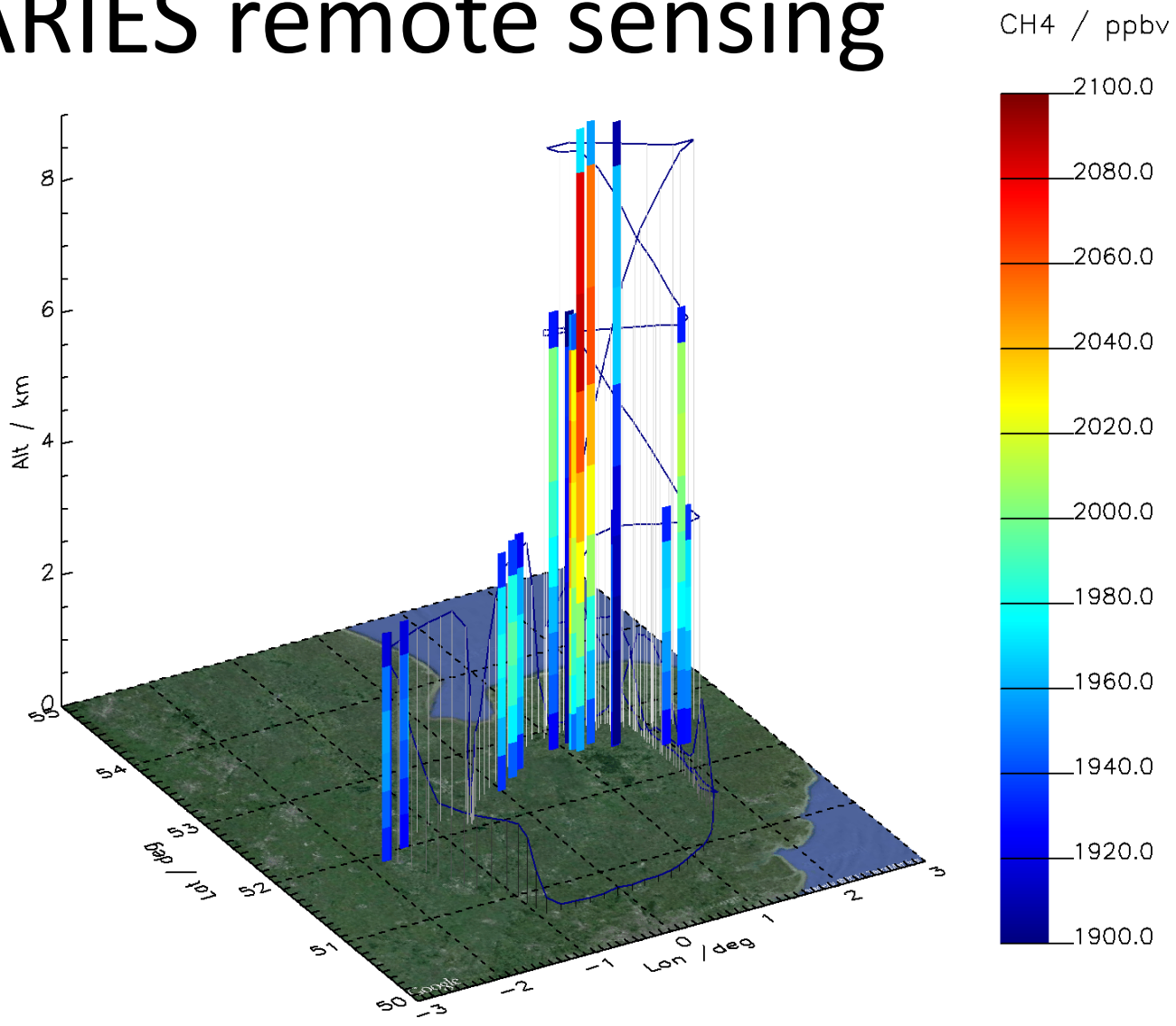
Conclusions

- Good quality CO_2 and CH_4 data from the FGGA available

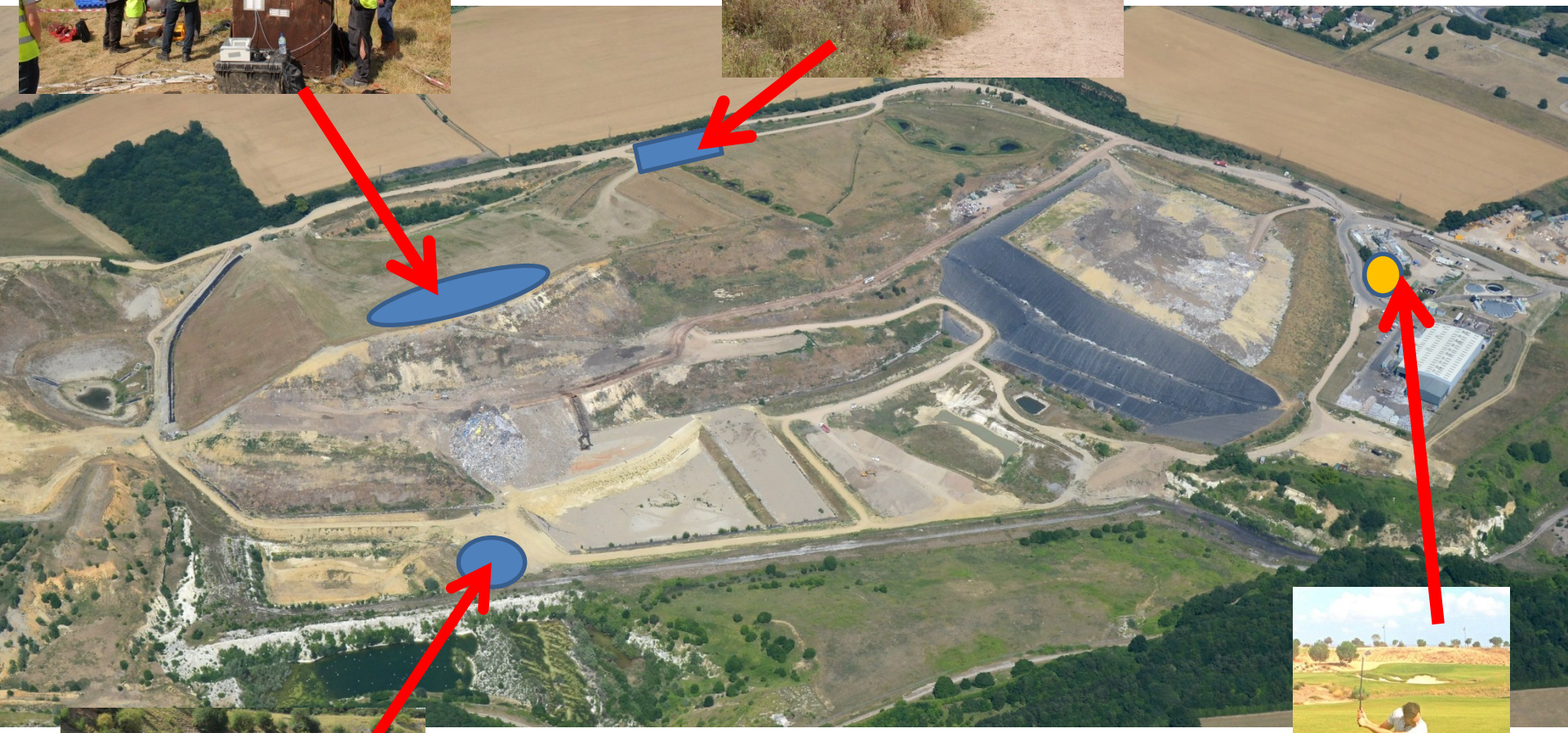
- N_2O data from QCL very soon

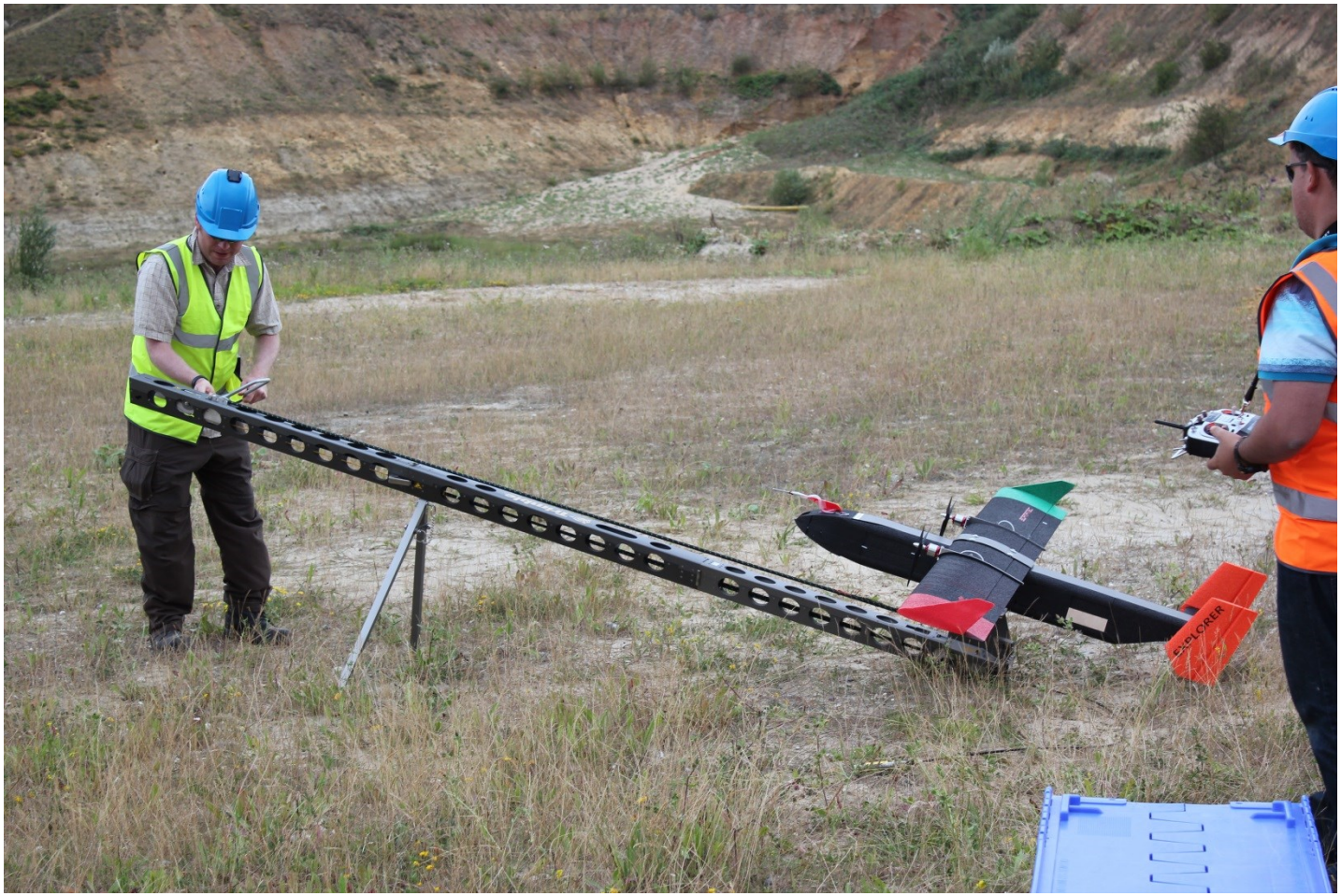
- ~60 hours of flying completed, ~30 remain for next year

ARIES remote sensing

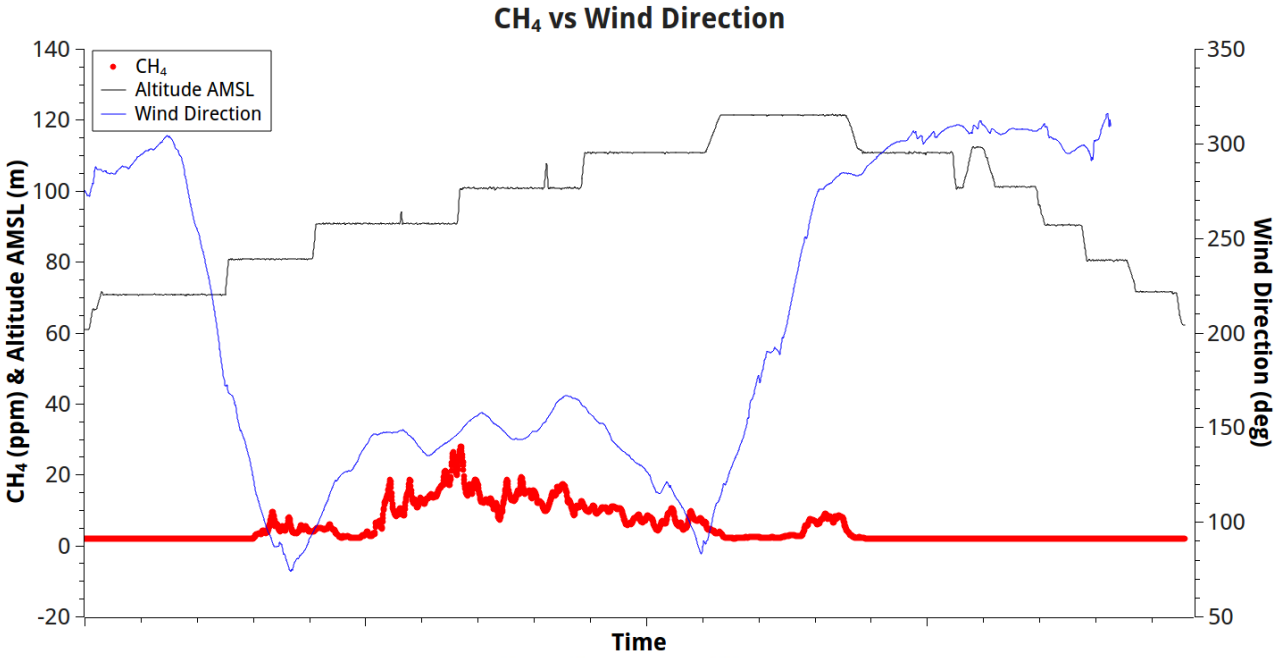


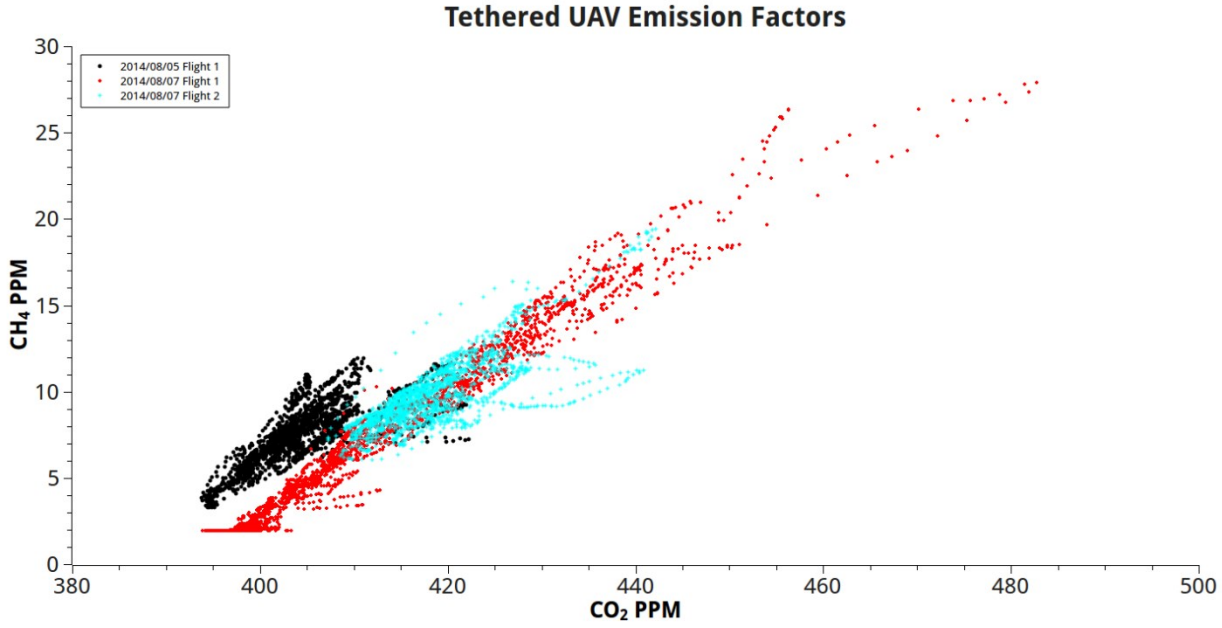
Landfill GHG emissions



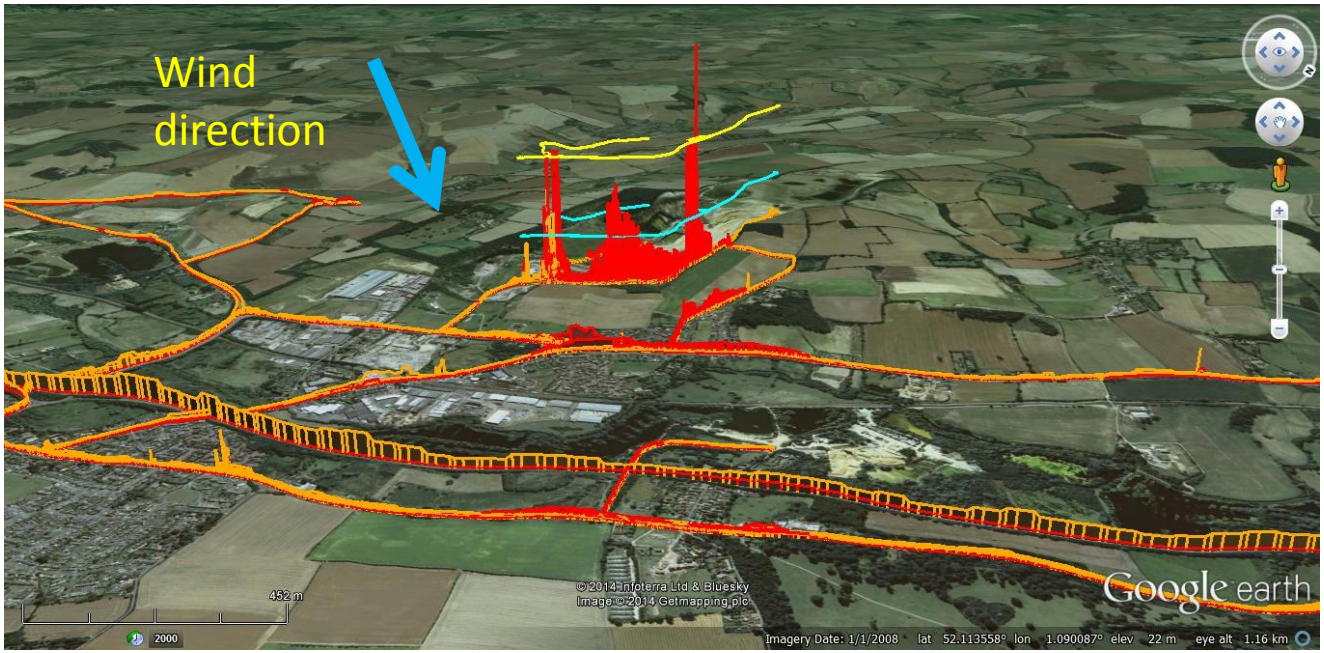

EXPLORER

UAV tests

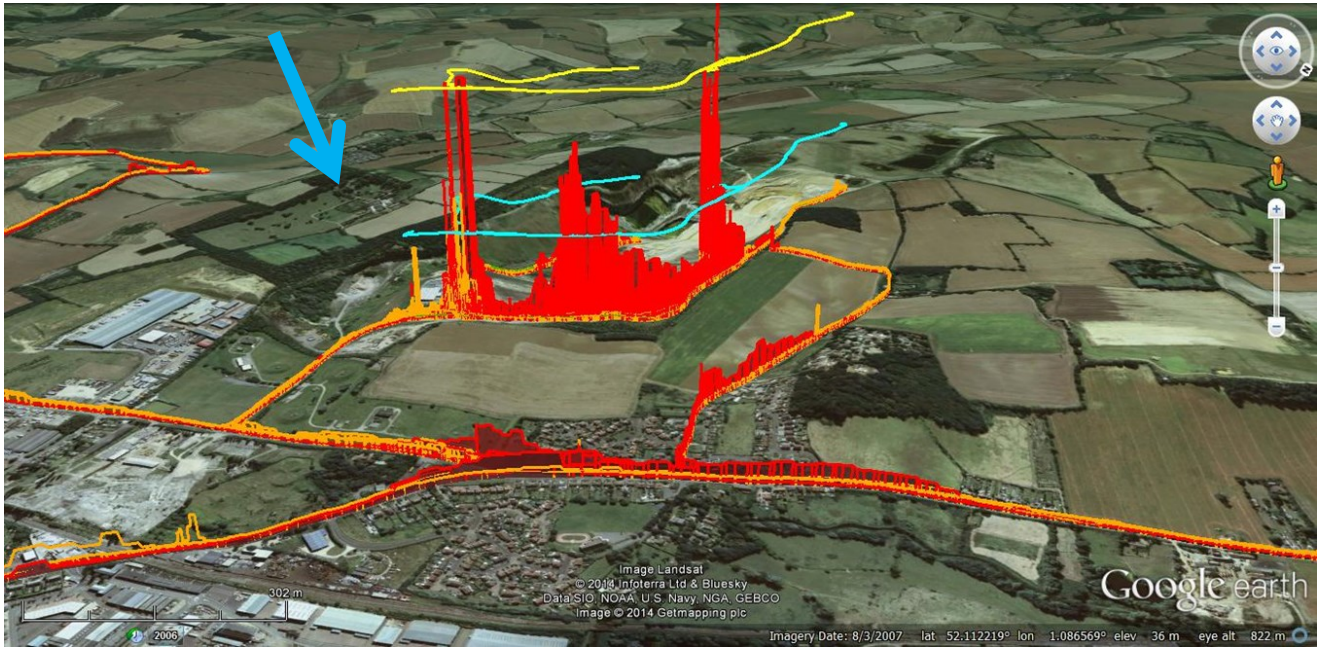

CH4 vs Wind Direction
CH4
Altitude AMSL
Wind Direction
CH4 (ppm) & Altitude AMSL (m)
Wind Direction (deg)
Time
140
120
100
80
60
40
20
0
-20
350
300
250
200
150
100
50


Tethered UAV Emission Factors
2014/08/05 Flight 1
2014/08/07 Flight 1
2014/08/07 Flight 2
CH4 PPM
CO2 PPM
30
25
20
15
10
5
0
380
400
420
440
460
480
500

CH4


Wind
direction
452 m
2000
© 2014 Infoterra Ltd & Bluesky
Image © 2014 Getmapping plc
Google earth
Imagery Date: 1/1/2008 lat 52.113558° lon 1.090087° elev 22 m eye alt 1.16 km

CO2


302 m
2006
Image Landsat
© 2014 Infoterra Ltd & Bluesky
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2014 Getmapping plc
Google earth
Imagery Date: 8/3/2007 lat 52.112219° lon 1.086569° elev 36 m eye alt 822 m