

NERC's capability for the provision of airborne platforms to support UK science; selected recent examples include GHOST and the NovaSAR-S X and S band airborne demonstrator

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# NERC's airborne platforms

- De Havilland DHC-6 Twin Otter (2 of 4)
- De Havilland DHC-7 Dash 7
- Dornier 228-101 (up to 2015)



# De Havilland (DHC-6) Twin Otter

**Wing span:** 19.8 metres

**Length:** 15.7 metres

**Take-off weight:** 5,670kg

**Engines:** Twin turbo prop

**Range:** 1,435km

**Maximum speed:** 130 knots

**Altitudes:** <35 to 5,000 metres.

Unpressurised but with oxygen fit for pilots and operators

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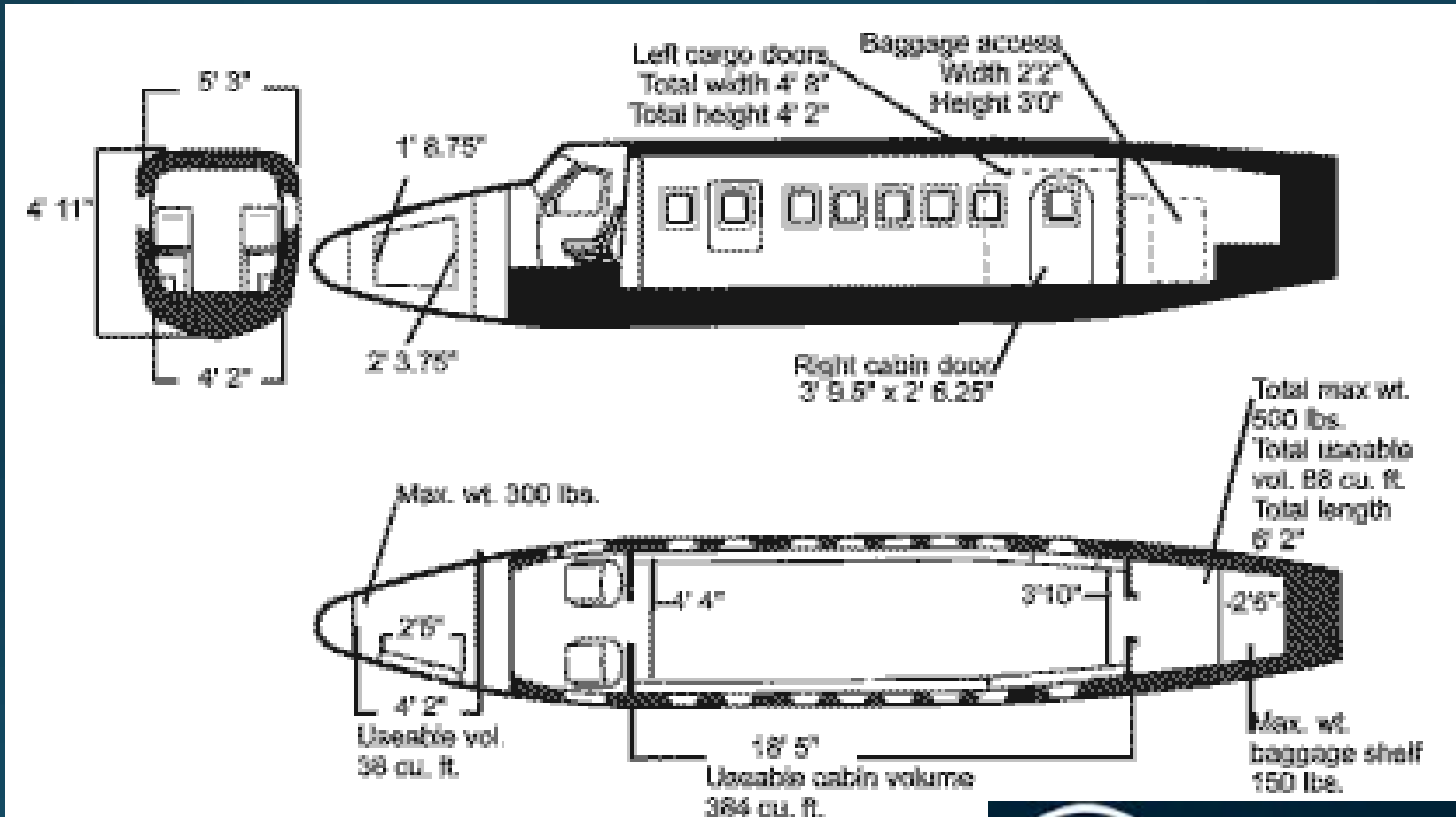
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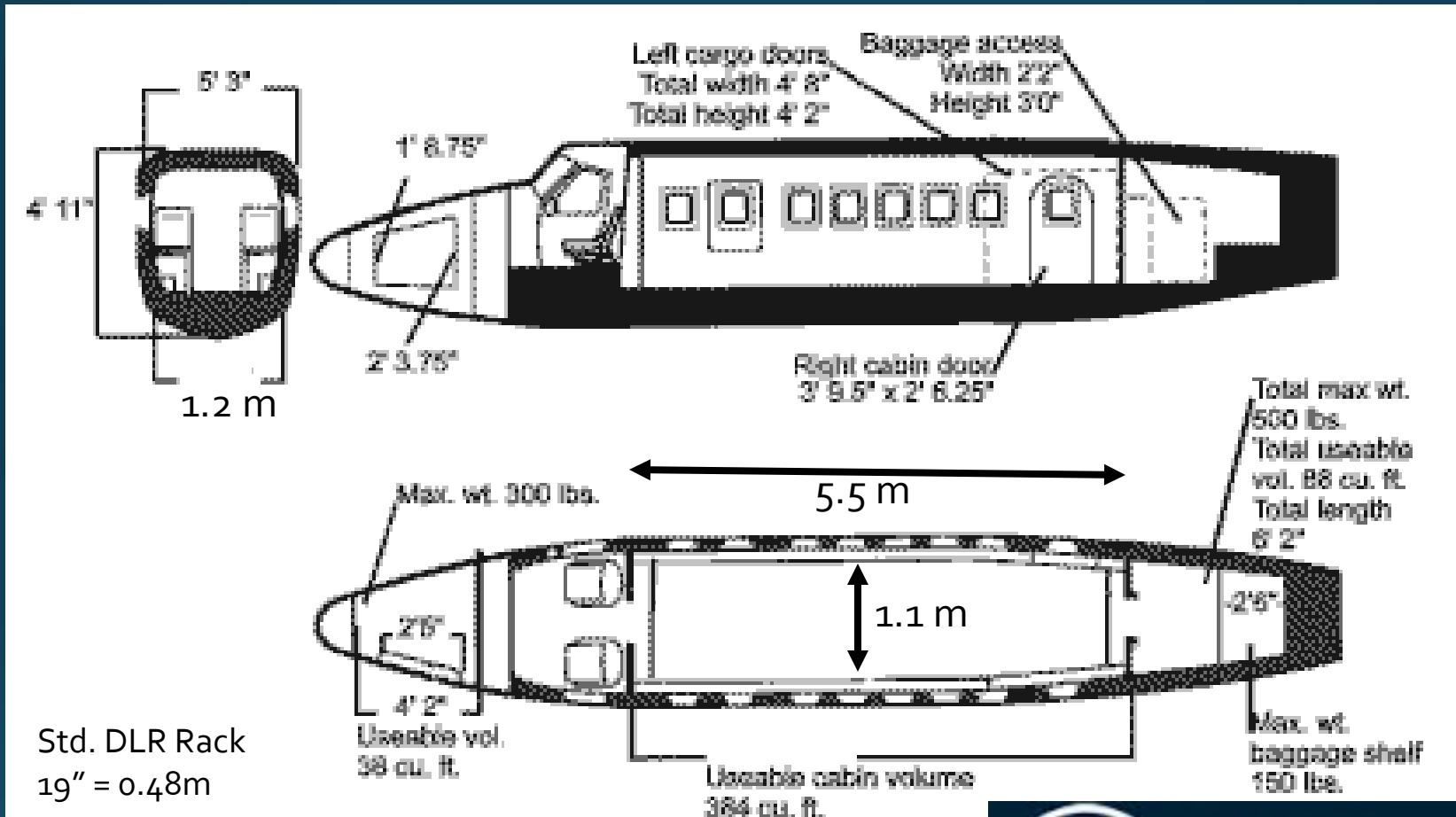


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Looking forward towards the cockpit

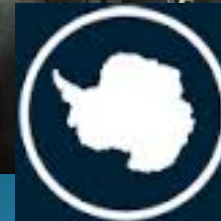


Looking rearwards towards the tail



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## Power (Twin Otter)

**Aircraft total electrical power (kW):**

8.4 kW at 28 VDC

**Electrical power (kW) and voltages (V) available for science:**

4.2 kW at 28 VDC

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# De Havilland (DHC-7) Dash 7

**Wing span:** 28.4 metres

**Length:** 24.5 metres

**Take-off weight:** 21,320 kg

**Engines:** 4 x turbo prop

**Range:** 4,000km (1,500km fully loaded, with required fuel reserves)

**Maximum speed:** 230 knots

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Aeromag 1994/1995

Photograph by Pete Bucktrout

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# Levels of regulation



# Levels of regulation



# Considerations

- Weight and Balance
- Electromagnetic Compatibility (EMC)
- Approved build quality and robustness for flight
- Provision of position and attitude information
- Air space restrictions (time, date & altitude)
- Allowance for operation by trained operators

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# Availability & Opportunities

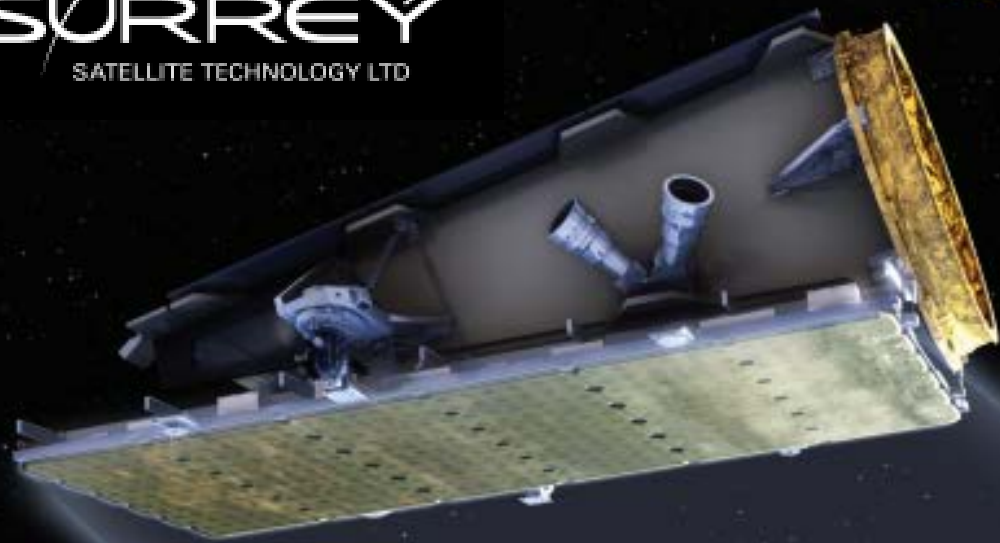






# NovaSAR-S

the small satellite  
approach to Synthetic  
Aperture Radar



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# Nova SAR-S



Proving flights in May 2014

Demonstration flights between 23-26 June 2014



## AirSAR acquired swaths

ID	Location	Lead User / PI	Application	# Swaths
AS14-Proving	Sawtry / Yaxley / Conington	Satellite Applications Catapult	Proving flights	10
AS14-01	Portsmouth / IoW / Solent	SSTL	Maritime monitoring	6
AS14-05	South of IoW	Aerospace Resources, SSC	Oil spill simulation	42
AS14-08	Wytham Woods, Savernake Forest, Marlborough Chimney Meadows Yarnton Mead	University of Leicester CEH University of Reading	Forestry Soil moisture Soil moisture	8
AS14-10	Sutton Farn	RSAC	Agriculture & forestry	6
AS14-12	RHS Wisley	Surrey Space Centre	Soil moisture	8
AS14-14	Waddeston <sup>1</sup>	CEH	Ecosystem mapping and Soil Moisture	2
AS14-15	Worcestershire	Magellium	Crop identification	18
AS14-17	Hollin Hill	British Geological Survey	Soil moisture	13
AS14-19	North York Moors, Peak district	Magellium	Heathland burning	14
AS14-21	Charmouth, Black Ven	Bournemouth University	Slope stability	8
AS14-22	Cranborne, Avebury	Bournemouth University	Archaeology	4
AS14-SA	Milton Keynes <sup>1</sup>	Satellite Applications Catapult	Land cover mapping	1
AS14-SA	Harwell <sup>1</sup>	Satellite Applications Catapult	Land cover mapping	3
AS14-ADS	Portsmouth <sup>2</sup>	Airbus Defence and Space	Land cover mapping	2
AS14-ADS	Worcestershire <sup>2</sup>	Airbus Defence and Space	Testing	2
CAL-ADS	Gloucester	All	Calibration	20
<b>Total</b>				<b>167</b>

<sup>1</sup> Waddeston, Chimney Meadows, Harwell, and Milton Keynes were data acquisitions added at request of Catapult under contract extension

<sup>2</sup> Portsmouth and Worcestershire test were opportunistic data acquisitions in transit

20 March 2015

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x-band



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x-band



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CAL 509, S-band, HH



CAL 509, S-band, VV



- high incidence angle ( $50^{\circ}$ - $61^{\circ}$ ), narrow swath (870m)



Harwell, 23 June 2014  
X-band quad-polar 20cm spatial resolution



# GHOST

GHOST (Greenhouse Observations of the Stratosphere and Troposphere), was developed by the Science and Technology Facilities Council's UK Astronomy Technology Centre in Edinburgh, in a joint effort with the Universities of Edinburgh and Leicester.

It is part of Natural Environment Research Council's (NERC) Co-ordinated Airborne Studies in the Tropics (CAST) project and NASA's Airborne Tropical Tropopause Experiment (ATTREX).

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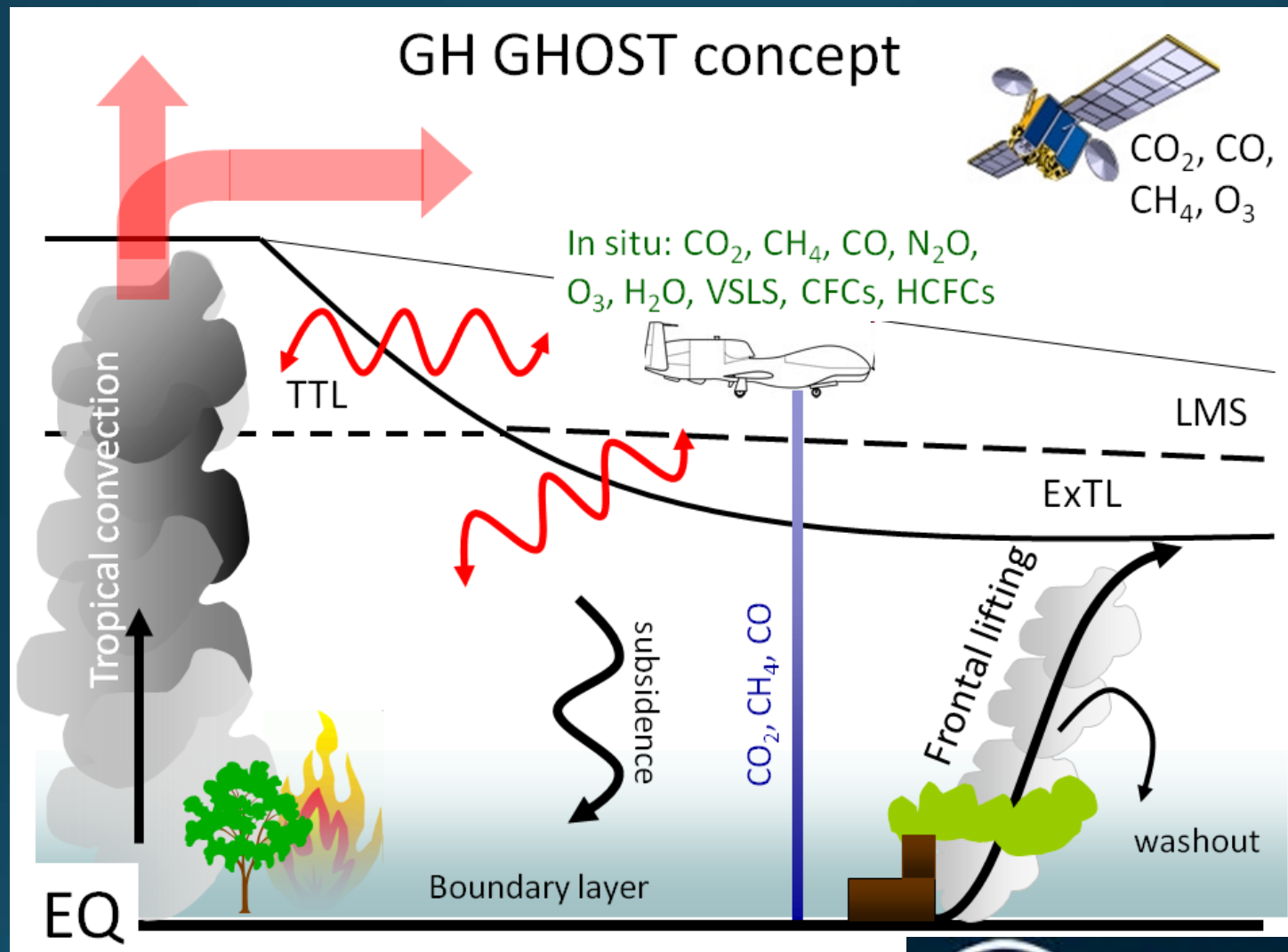
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# Global Hawk

(March 2015)



Tom Miller / NASA

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+ time stamp &  
navigation data



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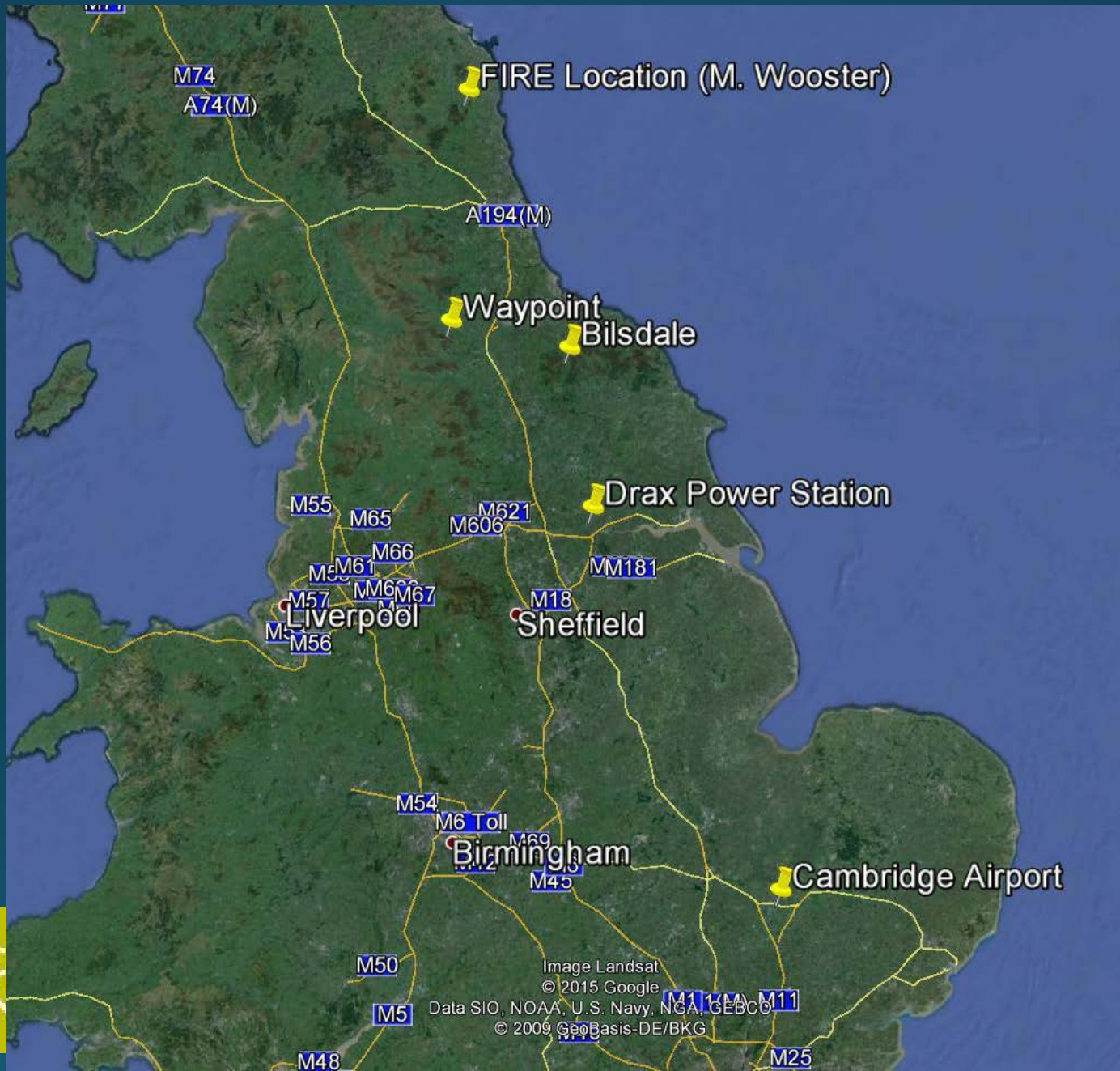


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# Conclusion

- NERC have airborne platforms available for use for hosts to airborne demonstrator instrumentation
- Specific timing will need to be negotiated
- In house expertise to support guest instruments
- Experience, capability and flexibility



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