



With the BAS De Havilland Canada Twin Otter pictured in the background, Martin Wooster explains the Hyperspectral Thermal Emission instrument campaign at Duxford Airfield. Photo: copyright King's College London.

# GETTING THE MEASURE OF CLIMATE CHANGE

Remotely sensed data that will help address global environmental challenges is being spearheaded by the UK as part of a unique international research partnership

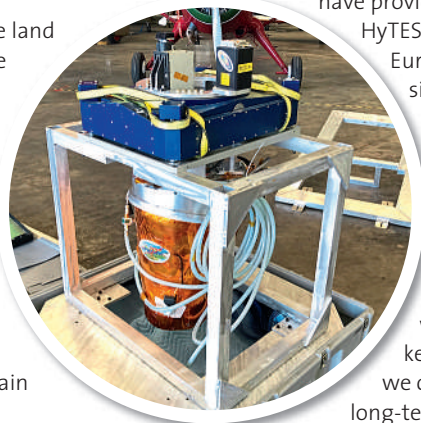


The work to gather vital data on urban heat, agriculture, water use, and food security in our changing climate involves both the European Space Agency and NASA, and is part of an ESA-NASA bilateral agreement.

Coordinated by King's College London and the Natural Environment Research Council's (NERC) National Centre for Earth Observation (NCEO), the NET-SENSE project will see an airborne sensing campaign conducted over parts of the UK and Europe over the next two years using one of the world's most sophisticated airborne thermal imagers, the Hyperspectral Thermal Emission Spectrometer (HyTES) from NASA's Jet Propulsion Laboratory (as pictured in inset below).

HyTES will be operated for the first time outside of the USA, mounted alongside a series of companion airborne imaging systems from NERC NCEO and inside a specialised Twin Otter research aircraft operated by British Antarctic Survey (BAS) and normally flown out of Britain's Antarctic bases.

HyTES accurately maps the temperature of the land surface at very high spatial detail from its airborne vantage point, using data collected in hundreds of different infrared wavelengths. Over cities these Land Surface Temperature (LST) data can be used to map sources of heat and investigate phenomena such as the 'urban heat island', whilst over agricultural regions they can be used as inputs into methods for mapping 'evapotranspiration' from plants and soil, which is the rate at which water is being transferred from the land to the atmosphere and directly related to agricultural water use and some of the main influencers of crop stress.



NET-SENSE will conduct new science by collecting airborne data over existing sites of agricultural experiments run by collaborators in the UK (NERC Centre for Ecology and Hydrology), as well as others in Italy and Germany, where 'ground-truth' measurements of LST, evapotranspiration, and crop stress will be made by King's College London/NCEO alongside these local investigators.

Importantly though, the campaign will also provide information crucial for helping plan a future European remote sensing satellite – the Land Surface Temperature Monitoring (LSTM) mission – that is currently being considered for inclusion in the next iteration of Copernicus, the European Union's flagship Earth Observation Environmental Monitoring Programme.

Martin Wooster, Professor of Earth Observation Science at King's College London and NERC NCEO, is leading the campaign organising from the European side. He said: "The Space Agencies NASA and ESA have provided a phenomenal opportunity to operate JPL's

HyTES thermal imaging instrument over the UK and Europe for the first time ever. Flying HyTES alongside our UK instrumentation offers a unique data collection capability that will provide both new science and information that can really have a strong influence on the design of the proposed new LSTM satellite.

"Examining our planet and its environment for the ultimate benefit of people is so important with the ever-pressing global challenges we face, and remote sensing from satellites is a key way to provide a consistent, global view that we can use to track and respond to both short and long-term change."



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