UK satellite mission to improve accuracy of climate-change measurements gains global support

TRUTHS (Traceable Radiometry Underpinning Terrestrial- and Helio- Studies) is a proposed satellite mission, led by the National Physical Laboratory, to improve tenfold the accuracy of earth observation satellites used to deliver climate change data.

TRUTHS will launch a calibration laboratory into space to help settle international debates around climate change and provide a robust statistical baseline from which to monitor and predict changes in the Earth's climate. Enabling the provision of data of sufficient accuracy to improve the predictive quality of climate models such as those of the UK Hadley centre a key requirement highlighted in the Stern review.

Since its initial proposal more than five years ago TRUTHS has been seeking the level of financial support required to convert it from theory to a fully-fledged satellite mission. Recent reports from the United Nations, the World Meteorological Organisation and the US Academy of Sciences all call for a spaceflight mission designed to achieve exactly what TRUTHS was established to deliver. The latter has even recommended such a mission as one of the four priorities for US spaceflight by 2013.

"We've seen a recent surge in recognition around the world that we need more accurate data about our climate," explains Dr Nigel Fox, NPL's lead scientist on TRUTHS. "This can only be good news. With so many influential organisations calling for a TRUTHS-like mission we hope to be moving from scientific theory to spaceflight very soon."

Why is TRUTHS important?

Assessments of climate change and the consequential scale of its impact depend on accurate data from scores of earth observation satellites. They ought to provide unequivocal evidence to support national and international legislation. But most earth observation data is disputable.

"We just don't know if the instruments are really accurate enough once they've been in space for a couple of years," Fox says. "What we do know is they all seem to produce slightly different results, and that gives a lot of unnecessary wriggle room to those who dispute the evidence for human origins of climate change. The uncertainty of the data allows the sceptics to exist."

The problem lies with calibration. Delicate measuring devices on earth – those used in medical and high-tech industries, for example – are regularly calibrated against primary physical standards held by national measurement institutes such as NPL. Instruments in space don't have this luxury. They are finely tuned before they leave the earth. "But after that we just don't know," Dr Fox says. "Even if these sensitive instruments survive the violence of a rocket launch, their sensitivity changes over time. But we don't really know by how much." It's not logistically or financially viable to bring these instruments back down to earth for a service every few months. "They can't come to us so we'll sort it out in orbit," says Dr Fox.

The idea is for TRUTHS to be a master device in orbit, against which other earth observation satellites are tested and calibrated. That ensures they will all be working off the same measurement benchmark. It also reduces costs – a central orbiting reference point means each individual satellite doesn't need to be equipped with its own individual suite of calibration tools.

Although the needs of climate science are perhaps the most demanding in terms of accuracy, such a mission

would also serve as a reference to underpin the quality of data that is being generated and processed as part of the European GMES initiative and also that of GEO.

Source: National Physical Laboratory