



Climate research helps fight terror threat

The fatal incidents at the Boston marathon earlier this year highlighted yet again the threat of terrorist bombs and chemical attacks. Security forces will be on high alert at such events but how can they be sure someone is carrying explosives until the damage is done? Damien Weidmann explains how climate change research could give them the upper hand.

Decades of research into climate change have led scientists to develop a range of techniques for measuring the levels of greenhouse gases in the atmosphere. These include remote sensing, using instruments flown on satellites which can accurately measure even very low concentrations of gases across large distances, using radar or lasers.

Because explosives emit tiny amounts of gaseous chemicals, they have potential to be detected in the same way as greenhouse gases but until recently there were no equivalent instruments for detecting these chemical traces at ground level.

Funded by the Centre for Earth Observation Instrumentation (CEOI), a collaboration of academic and industry researchers, scientists at the Rutherford Appleton Laboratories have now adapted a remote-sensing instrument called an Active Coherent Laser Spectrometer (ACLS) to do just that.

ACLS works on the principle that different chemicals have a unique effect on the wavelength of light that passes through them. It directs a beam of laser light towards the area of interest, which is reflected off buildings and other surfaces back to the spectrometer. Any chemicals present in the laser's path will change the properties of the returning light so the spectrometer can detect exactly which chemicals are present and their concentration.

The technology is already effective at a distance of 50 metres from its target and it will be able to operate up to several hundred

metres, so it can be used with no risk to the operator. The laser is harmless to eyes and the trolley-mounted kit is compact (with plans to produce a tripod-mounted version), robust and cost effective. It's also quick, giving results in seconds to a minute depending on the accuracy needed. ACLS has wider applications too. It can be used by fire services to check for hazardous chemicals at accidents and fires, and by the military to monitor for chemical warfare agents. Environment agencies can use ACLS to remotely monitor pollution from factories and local councils will be able to use it to check air quality.

CEOI is behind a wide range of innovative new instruments that measure our weather, our atmosphere, the ice caps and many other aspects of the natural environment. The Active Coherent Laser Spectrometer is just one example which is finding fascinating and potentially life-saving applications in everyday life.

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For more on this technology and others funded by the CEOI visit www.ceoi.ac.uk