



Autonomous Airborne Radiation Monitoring System (AARM)

Real-time location, measurement
and mapping of radioactivity with
isotope identification

Accurate, affordable and versatile low-altitude aerial
radiation detection vehicle



Imitec AARM



Applications

- Rapid emergency response monitoring of radiation events, providing real-time data on spread, source and intensity
- Routine monitoring of nuclear installations throughout the life-cycle from new-build to decommissioning
- Monitoring radiation in the oil & gas industry
- Environmental monitoring for radiation hazards
- Exploring for Rare Earth Elements
- Defence and Homeland security operations

AARM Benefits

- Minimise operator risk
- No operator shielding of micro-gamma spectrometers
- Rapid response
- Wide area coverage
- Isotopic fingerprinting
- Pre-programmed flight paths
- Terrain and hazardous environments independent (over trees, fences, buildings, steep slopes, dangerous ground)
- Rapid, more detailed surveys
- Combination of radiation mapping with aerial imaging and observation

Early and rapid detection of contamination in inaccessible places

AARM minimises the risk and impact of radiation by enabling early and rapid detection of contamination, even in inaccessible places, and eliminates the potential exposure of monitoring teams.



The Kromek offer:

- ImiTec's AARM payload including Kromek's trusted and proven gamma spectrometers
- ImiTec's bespoke data processing software or data hosting service
- Kromek can either provide a small unmanned aircraft system (drone) or the AARM can fit into existing systems
- System training and commissioning at client's site or online if required
- Through-life support including help desk



AARM Characteristics

- Choice of Kromek CsI or CZT micro-gamma spectrometers
- Sub-metre mapping resolution for flying at 1-3 metres altitude
- Counts per second (CPS) and gamma spectrometry spectral data transmitted in real-time
- All data encrypted in AES and RPA format
- All data simultaneously recorded and stored on board
- Bespoke software for processing radiation data in real time
- Laser ranging to determine height above ground to ~1mm over 100m
- Weight of less than 1Kg
- Typical SUAS characteristics:
 - Range - 1km or line-of-sight (legal)
 - Autonomous deployment and mission capability

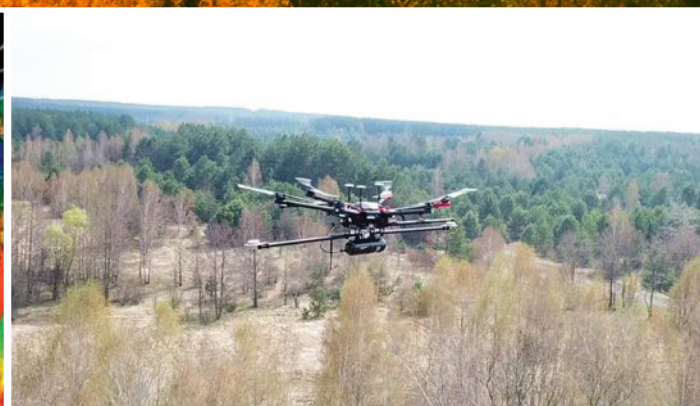
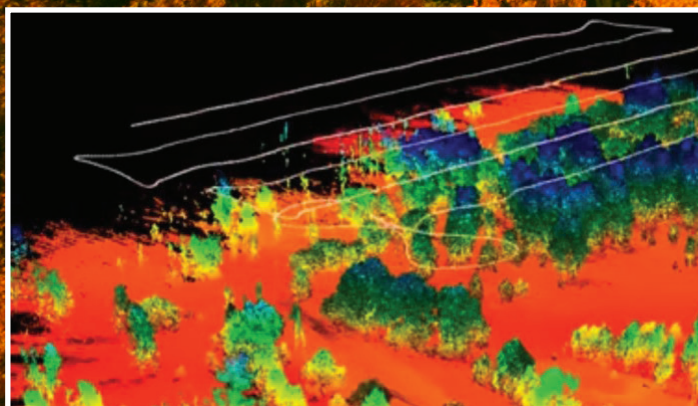


AARM Payload



Kromek micro-gamma spectrometers: GR1 (L), SIGMA 50 (C) and SIGMA 25 (R)

Chernobyl's 'Red Forest' - one of the most radioactive places on Earth - has been surveyed several times by UK scientists using a fleet of drones equipped with Kromek detectors

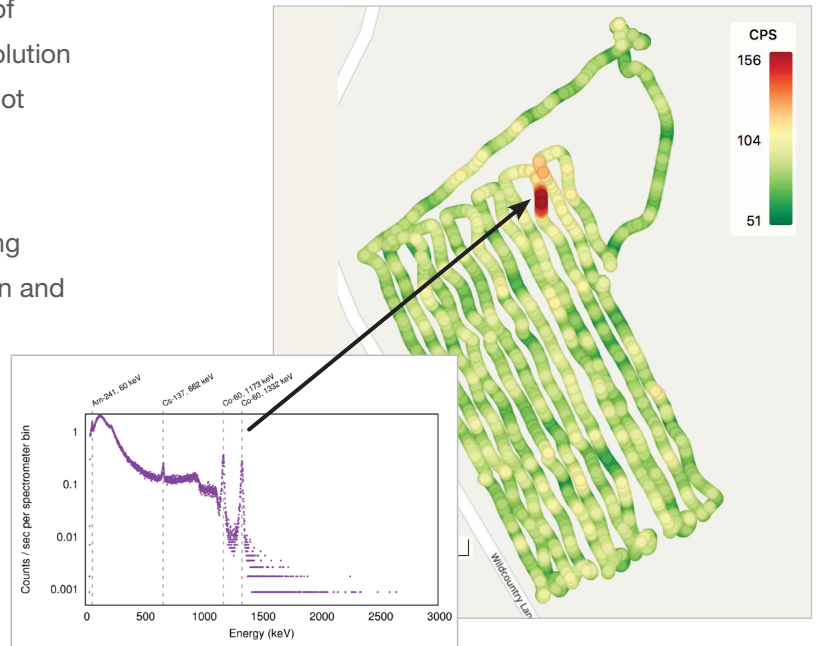


Drone flying over the Red Forrest: Each survey route is saved as a collection of GPS waypoints, altitudes and velocities allowing the same survey to be conducted repeatedly to study any change in the distribution of radioactivity over time.

Real-time location, measurement and mapping of radioactivity with isotope identification

The AARM system delivers metre resolution maps of radiation including over high dose areas and inaccessible locations whilst minimising the risk of operator exposure. It allows a level of spatial resolution not previously achievable in radiological hazard hot zones.

AARM measures and maps radioactivity and the isotopes present in real-time significantly speeding and improving the efficiency of radiation detection and decision making.

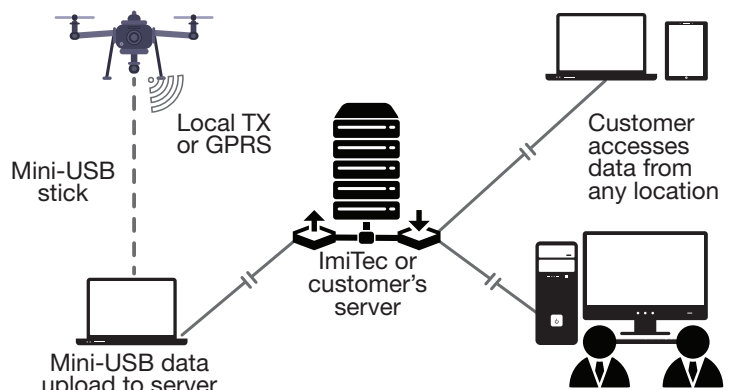


Exemplar AARM Mapping and Isotopic identification

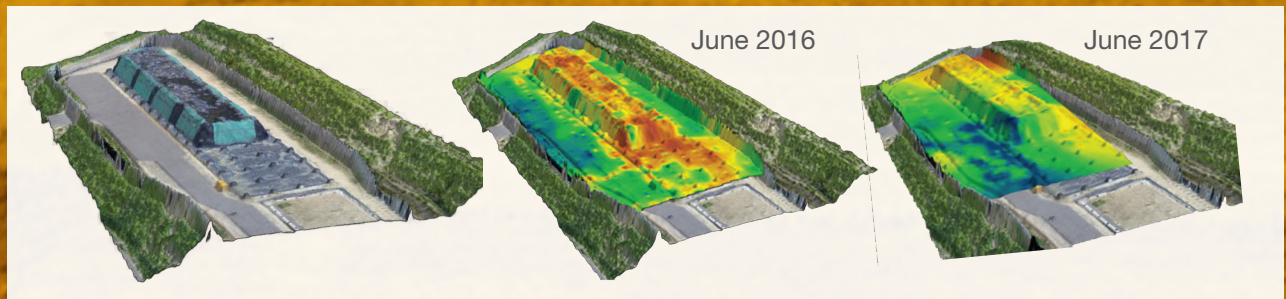
Real-time data collection and transmission through a secured network

Data is transmitted through a secured network utilising a local radio or mobile phone network to a dedicated base station server. This allows the drone's operators, and/or remote decision makers, to view and interrogate the data as the survey progresses.

Data is also stored on an on-board mini-USB memory stick for subsequent downloading.



AARM Data Network



Main pic: a drone undertaking an aerial survey over contaminated fields in Fukushima, Japan. Below: series of images from a repeated study showing a heat map from stored contaminated debris. (L) General picture of the site (C) survey undertaken in June 2016 (R) survey repeated in June 2017 showing the change in the distribution of radioactivity over time.



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