

The development of an advanced airborne gamma-ray spectrometry system

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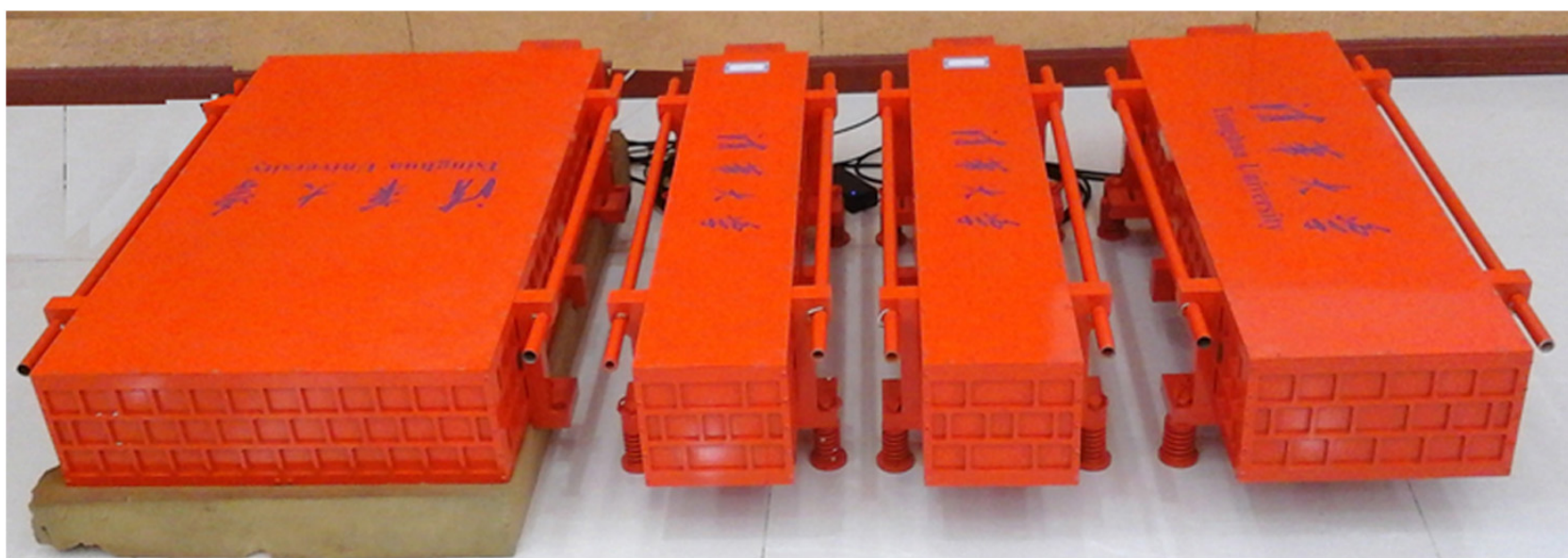
The airborne gamma spectrometry technique is widely used for environmental monitoring or use in emergency response, as well as for studies of the environment of nuclear sites for reference purposes. An advanced airborne gamma-ray spectrometry system has been developed lately by Tsinghua university. The system used consisted of optional volume NaI (Tl) spectrometer, an electronics rack containing power supplies and computer, and GPS systems for logging the aircraft position and navigation. The array detectors were designed with optional volume NaI (Tl) of 4 l, 8 l, 16 l, 32l, or some of them to be used in different settings, such as car or unmanned aircraft and airborne surveys, and on the different scenarios. Spectra data are recorded in 1024 channels from 50 KeV to 3 MeV for each individual detector. Optional one or two self-adjustment-stabilization spectrum loops were designed for spectrum stability. Real-time stabilization on natural radioactive elements, 2614KeV (208Tl), or/ and 1460KeV (40K) and stabilization time of less than 30 seconds. An area of uranium milling site has been flown for testing the system feature and radioactive mapping. The system was installed in a helicopter. The calibrations of the system have been carried out under well-controlled conditions in the metrology station of the nuclear industry. The helicopter flew at an altitude above the terrain of 60 m. Line direction is North-South. The normal line spacing was 50 m and the velocity was around 100 km/h. Data were recorded each second together with GPS coordinates, and then processed to calculate nuclide radioactivity and gamma -ray dose rate for mapping. The results show the background distribution of the gamma-ray dose rate reflects local geology. Some hot spots and regional radiation elevated were found in facilities and a tailing pond. The data sets also serve as a reference against which future changes can be measured. The system maintained in good feature during measurements.



Fixed wing airborne monitoring



Gamma spectrometry system



NaI(Tl) detectors with volume of 16L or/and 4L, or/and 4L, or/and 8L

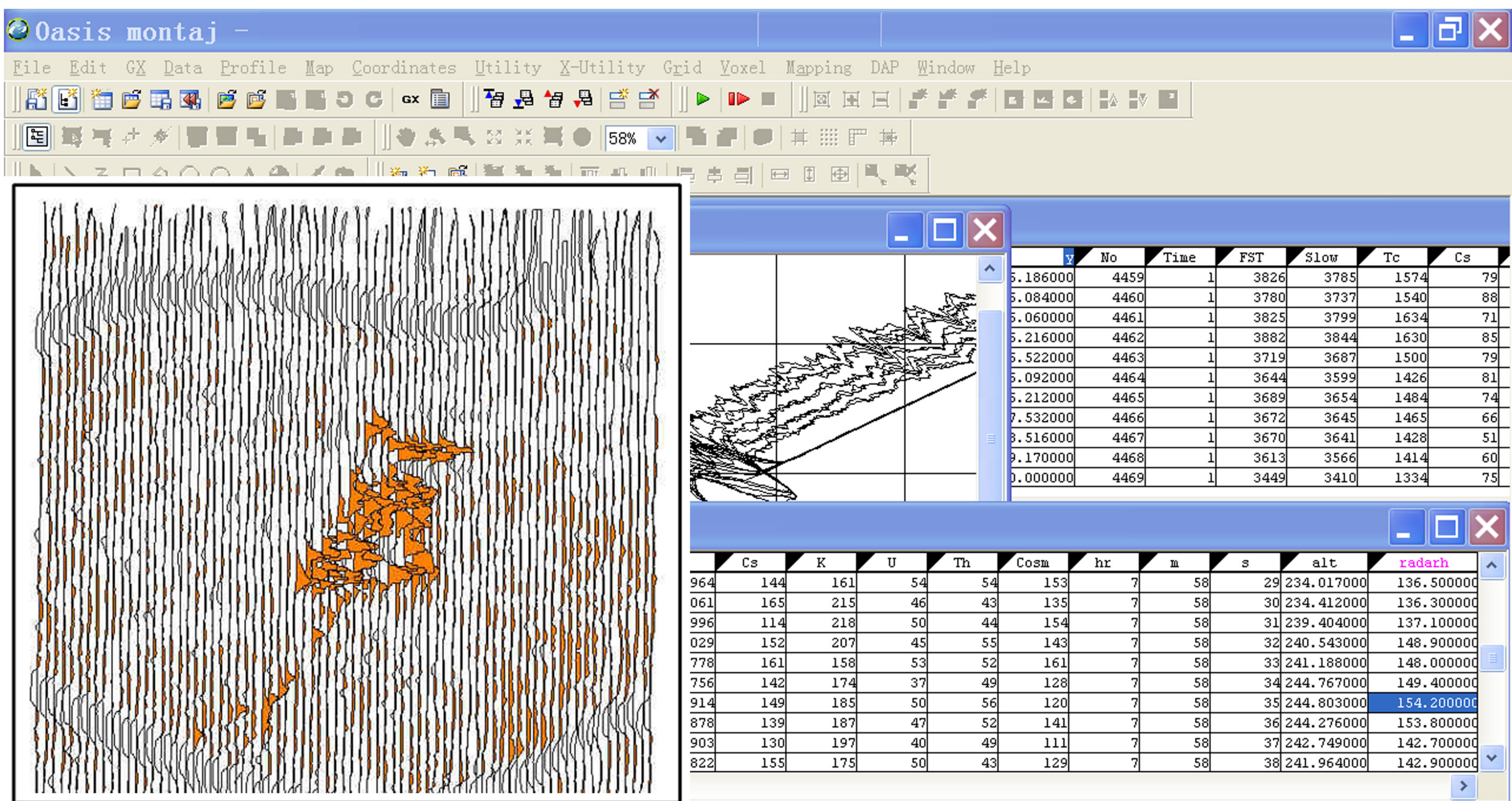
The array NaI (Tl) detectors



Helicopter airborne monitoring



Vehicle monitoring



A case study