

Geophysical Techniques for Pollution Detection

FROM THE AIR: DRONE TECHNOLOGY

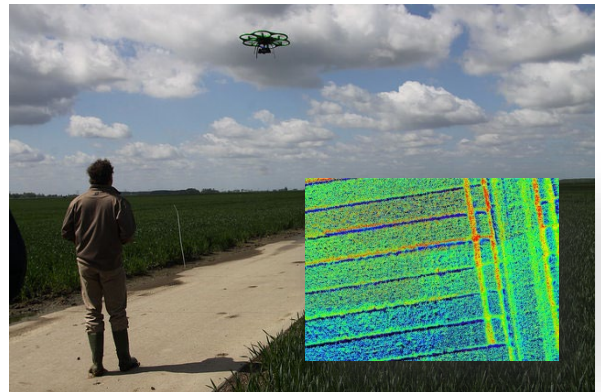
With the help of T&A Drone Services' drones, the environment can be monitored for erosion, land degradation and the encroachment of invasive species. Pollution and environmental disasters can be monitored and the appropriate restorative action plans can be identified and carried out.

Drones offer a time and cost-effective means of collecting high resolution data for environmental survey and monitoring purposes. The use of a drone allows the inspection of areas which are otherwise difficult or dangerous to access. Drones can also cover a vaster area compared to conventional survey methods.

The high-res images transmitted by the drone can be viewed in real-time or immediately after flight. If necessary, more detailed on the spot inspections can be carried out. Since the flight plans are based on GPS positions, they can be repeated on a regular basis for purposes of comparison, analysis and planning.

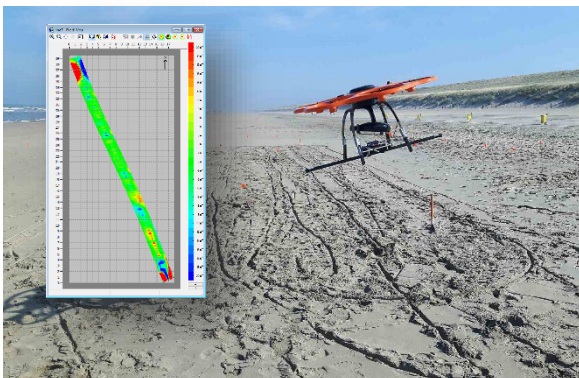
DRONE INFRARED (IR) SPECTROMETRY

Drone IR spectrometry measures the infrared absorption of an object. By determining which frequencies have been absorbed, it is possible to determine which chemical bonds occur in the measuring object. The percentage of light reflected by the object is displayed as a graph called an infrared spectrum. An infrared spectrum is a representation of the frequencies of the absorbed infrared light. By using this spectrum, it is possible to analyse which chemical compounds occur in the object of investigation.



In environmental research IR Spectrometry can be used to determine the chemical composition of pollution and to map the weak spots or diseases such as mould in the vegetation, which can be an indicator for soil pollution.

DRONE MAGNETOMETER & GRADIOMETER



With the Drone magnetometer and gradiometer, ferrous objects and soil layers can be detected from the air. The drone magnetometer system has been successfully used in several (international) projects.

Magnetometer and gradiometer measure the earth's magnetic field. This field varies due to local deviations such as ore deposits or ferrous objects. By measuring this local deviation from the total magnetic field, the location of underground infrastructure or landfills can be

determined. Magnetometer and Gradiometer can also be used to detect pollution on land and in the waterbed.

DRONE METHANE DETECTOR

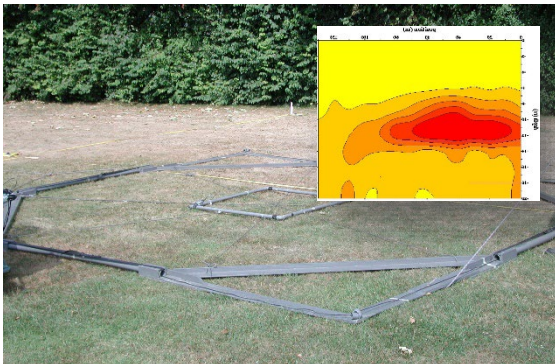
The drone methane detector can be used to detect and measure methane emissions from landfills. To perform these measurements, a multirotor drone equipped with a methane laser is used. The methane laser measures the concentration of methane gas in the air and can thus detect gas leaks.



The measurement principle of the drone methane detector is infrared absorption technology. It uses the characteristic of methane absorbing laser beams (infrared rays) of a specific wavelength. If the laser beam is directed at a target, it will reflect back a diffused beam. The device receives the reflected beam and measures the absorption, which will then be calculated into methane column density (ppm-m). Due to the fast spreading of methane from a leak, the best results are obtained in calm weather.

ON LAND: MEASUREMENTS FROM THE SURFACE

MAPPING CONTAMINATION WITH NANOTEM



NanoTEM can be used for the detection of contaminants that influence the conductivity of the soil. The NanoTEM technique, determines both the horizontal and vertical distribution of the contamination.

During the measurements with NanoTEM, a measuring loop which transmits a signal is placed on the surface. The measuring loop contains a smaller measuring loop which records the transmitted signal and the way it was influenced by the substrate.

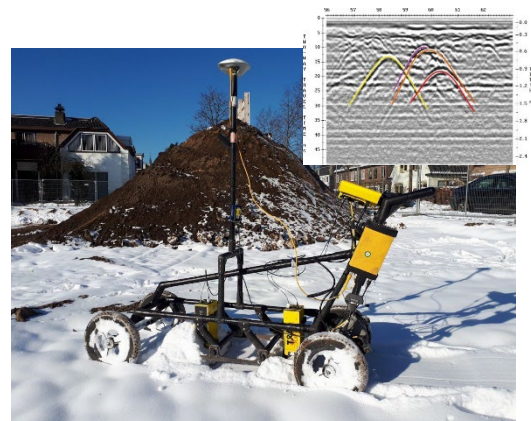
With NanoTEM a continuous, three-dimensional image of the contamination is obtained. The area with highly increased conductivity (red) is where the contamination is located. From the profile, it is easy to determine the horizontal and vertical boundaries of the contamination.

GROUND PENETRATING RADAR (GPR)

GPR is an electromagnetic reflection technique which quickly and accurately maps the upper meters of the soil. This highly accurate geophysical technique is used for locating objects and soil layers which are difficult to detect.

Through a transmitting antenna GPR transmits electromagnetic waves into the ground. When the material properties change, these waves are reflected by the soil and registered by a receiving antenna.

Ground radar has many applications in pollution research such as the location of leaks in pipelines, underground oil drums and oil tanks, the mapping of soil layers and the water table and determining the thickness of rubble layers.



OFFSHORE: DETECTION IN AND ON THE WATER

MAGNETOMETER AND GRADIOMETER

Pollution detection can also be performed in and on the water. With offshore and inshore surveys T&A maps the bottom of the sea, rivers, canals and lakes using hydrographic and geophysical techniques. To perform these surveys, we have hydrographic and geophysical experts, various survey vessels and a team of certified divers.

To detect ferrous objects and soil layers in the sea bed, magnetometer and gradiometer technology is used. Magnetometer and gradiometer are capable of looking several meters deep into the seabed.

To perform pollution detection in and on the waterbed, a multi-probe magnetometer is attached to a survey vessel. For offshore surveys, ROV (remotely operated underwater vehicle) and/or an AUV (autonomous underwater vehicle) equipped with magnetometer and other measuring techniques can be used.



CONTACT DETAILS

For more information about pollution detection and what we can do for you, please don't hesitate to contact us.

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