SPH Engineering



Success Stories Brochure



Elevating Surveying with Drone Technologies

SPH Engineering is an expert in drone technology development with over a decade of experience in creating advanced solutions for unmanned aerial surveying. We hold a solid global presence, with a customer base and partner network in over 150 countries.

Our team focuses on delivering drone-related solutions to businesses and organizations in the following areas:

DRONE PROGRAM DESIGN AND LAUNCH
for efficient drone integration into business operations to achieve quicker results

FLIGHT MISSION PLANNING AND CONTROL
for safe and optimized drone operations with better planning

DATA ACQUISITION
to gain insights from drone operations for smarter decision-making, improved efficiency, higher accuracy, and reduced personnel risk

DATA PROCESSING AND INTEGRATION
to increase productivity and drive innovation through actionable insights

SPH Engineering empowers professionals to collect high-resolution, accurate data in places where traditional survey methods fall short.

Italy

Oil and Gas

Drone Methane Detection Kit Cuts LNG Site Surveys from Weeks to One Day

Ileron, an environmental engineering consultancy, replaced labor-intensive ground methane surveys with SPH Engineering's integrated Methane Detection Kit (UgCS + SkyHub + Falcon) to inspect a Liquefied Natural Gas (LNG) facility. Traditional ground crews covered just 15 hectares per day with one to two personnel, producing isolated data points instead of the site-wide overview needed to prioritize maintenance and meet safety regulations.

Using UgCS to design automated, terrain-following flight plans, SkyHub to log GPS-stamped sensor data, and Falcon TDLAS sensor to detect methane from a safe altitude, Ileron completed the entire LNG site survey in a single day. Every measurement was geo-referenced, allowing emission hotspots to be mapped against the underlying infrastructure.

Key Insight

Full LNG site surveyed in 1 day vs. ~15 hectares/day with ground crews, while delivering richer, GPS-stamped data. The aerial approach gave Ileron a "strategic big picture" of methane distribution across the facility, allowing teams to focus maintenance on emission hotspots rather than chasing isolated data points.

- Full site survey in 1 day
- GPS-stamped methane readings
- Strategic site-wide leak mapping
- Safer than walking active LNG zones

> "We have tried several methane gas sensors, but the Falcon System by SPH Engineering is by far the best in every aspect."
>
> — Filippo Fiaschi, Ileron



Switzerland

Academia

Drone-Based 4D GPR Captures 68% Roof Thinning and 16% Cavity Growth at Switzerland's Rhône Glacier

The CRAG group at the University of Lausanne deployed a drone-based Ground Penetrating Radar (GPR) system over Switzerland's Rhône Glacier to map a collapsing subglacial cavity that traditional methods could not safely reach. Crevasses, unstable ice, and rapid internal changes made boreholes and ground surveys too dangerous and too low-resolution to monitor the feature.

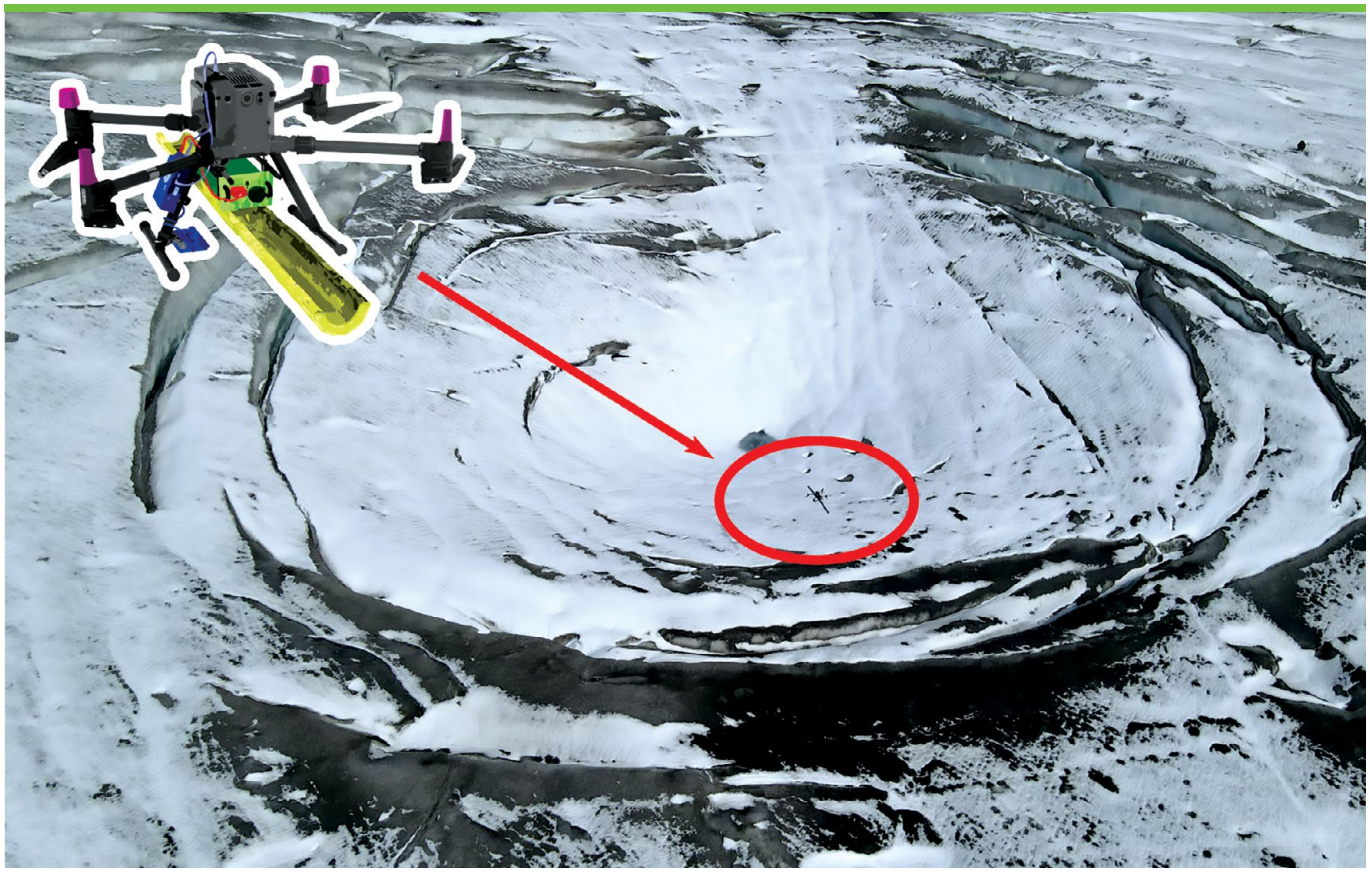
A UAV equipped with a custom 80 MHz GPR antenna and RTK GPS flew automated missions using SPH Engineering's UgCS with True Terrain Following (TTF), maintaining a consistent 5 m altitude above the uneven glacier surface. Between July and October 2022, the team completed four high-density surveys at 1 m line spacing, producing a true 4D dataset (3D over time) of the collapse feature.

The data captured the cavity's evolution in unprecedented detail, including channel widening, fracture development, and roof subsidence.

Key Insight

Ice roof thinned from 9.6 m to 3.0 m (–68%) and cavity height grew from 15.9 m to 18.4 m (+16%) across four months, captured with sub-meter resolution. The drone-based GPR resolved internal fractures, evolving meltwater channels, and gradual roof sinking.

- 4D dataset across 4 monthly surveys
- 1 m line spacing, 5 m AGL via TTF
- –68% ice roof thinning detected
- +16% cavity height growth
- Tracked meltwater channel re-routing





Canada

Mining and Mineral Exploration

Drone Radiometric Survey Surpasses Helicopter Resolution and Reveals New Uranium Anomalies

At a remote uranium deposit accessible only by charter aircraft and helicopter, Altomaxx deployed a drone-based radiometric workflow to deliver higher-resolution data than previous helicopter surveys. The site's hilly terrain, dense vegetation, boggy ground, and absence of cellular connectivity made traditional ground surveys slow, hazardous, and unable to reliably guide drilling decisions.

Altomaxx integrated Medusa MS350 gamma-ray spectrometer with SPH Engineering's SkyHub onboard computer and UgCS flight planning software on a UAV platform. Flights were executed at approximately 2 m/s with radar-altimeter-based terrain following, producing one radiometric data point roughly every 2 meters. The resulting dataset surpassed legacy helicopter resolution and revealed new anomalies that helped refine geological models.

Key Insight

Drone-based radiometric data exceeded helicopter survey resolution, enabling more precise anomaly delineation and the discovery of new radiometric anomalies validated by geological follow-up. The workflow also reduced field exposure and built lasting in-house capability, with plans to scale to thousands of line-kilometers in upcoming seasons.

- Higher resolution than helicopter surveys
- ~1 data point every 2 meters
- New anomalies detected
- Independent client operation enabled
- Safe, repeatable workflow in remote terrain



USA

Oil and Gas

UAV Magnetometry Detects 22 of 25 Abandoned Gas Wells in California Wetland Restoration Area

To support a wetland restoration project across a 2,200-acre rice cultivation and waterfowl habitat area in California, a project team led by Michael Detwiler used SPH Engineering's MagNIMBUS magnetometry system to locate abandoned gas wellheads. Many wells were no longer visible at the surface due to agricultural activity, sediment accumulation, and irrigation infrastructure, while metallic farm features introduced magnetic noise that complicated detection.

Surveys were conducted with a DJI Matrice 350 RTK equipped with the MagNIMBUS system, the SkyHub onboard computer, and UgCS flight planning software. Rather than flying the full 2,200 acres, the team designed targeted 500 ft × 500 ft survey blocks over each known or suspected wellhead, flying at roughly 5 m AGL with 5 m line spacing. Over four field days and roughly 35 flights, the targeted approach identified the majority of abandoned wells plus previously unmapped buried pipelines.

Key Insight

22 of 25 abandoned wells were successfully detected, and 7 horizontal pipelines associated with historical gas infrastructure were identified. A targeted block-by-block strategy delivered high-resolution magnetic anomaly data while minimizing field disturbance across a sensitive wetland landscape.

- 22/25 abandoned wells detected
- 7 buried pipelines identified
- ~5 m AGL, ~5 m line spacing
- ~35 flights across 4 field days
- Non-invasive over agricultural wetlands

Canada

Mining

Drone Magnetometry Detects Buried Ferrous Debris Up to 3.5 m Deep at Active Open-Pit Mine

An open-pit mining operation faced recurring downtime caused by ferrous debris, including hardened-steel loader bucket teeth, entering the rock crusher and damaging critical processing equipment. Manual handheld metal detection across rocky terrain and active machinery zones was both inefficient and unsafe.

Altomaxx deployed SPH Engineering's integrated solution: a SENSYS MagDrone R3 magnetometer mounted on a DJI M300, paired with a DJI RTK base station, the SkyHub onboard computer, and UgCS flight planning software. The team executed an automated grid with terrain-following navigation guided by a laser altimeter. Initial validation buried steel samples at 6 inches, followed by a more demanding test with targets buried 1 to 5 meters deep under crushed rock ranging from wallet-sized stones to boulders.

The system delivered precise, RTK-georeferenced detections that allowed to remove debris before it reached the crusher.

Key Insight

Small ferrous targets were reliably detected at depths up to 3.5 m through heavy crushed rock, with RTK-pinpoint coordinates for each anomaly. The drone-based approach removed personnel from active hazard zones while delivering targetable location data for debris removal, simultaneously protecting equipment and improving site safety.

- Targets detected up to 3.5 m deep
- RTK pinpoint location accuracy
- Automated grid over active operations
- No personnel exposure in debris fields
- Replicable across heavy-industry sites



Mongolia

Mining

Drone-Based Bathymetry Supports Ongoing TSF Pond Monitoring at Oyu Tolgoi Mine

Since 2025, Best Survey Mongolia has used SPH Engineering's UAV-based bathymetry kit to monitor a roughly 15,000 m² water pond inside the tailings storage facility (TSF) at the Oyu Tolgoi Mine. The TSF environment offered no safe deployment point for a crewed boat or USV, while routine monitoring still required reliable depth distribution data for water level tracking, capacity assessment, and risk management.

The team deployed a DJI M350 RTK equipped with an SPH Engineering bathymetry kit using the ECT D052S echo sounder, integrated through the SkyHub onboard computer and flown using UgCS flight planning software. Predefined survey lines provided consistent, repeatable coverage of the pond, with operators remaining well outside the TSF area for the entire mission.

Key Insight

Routine bathymetric monitoring of a 15,000 m² TSF water pond is now conducted without vessel deployment or operator exposure to tailings-related risks. The drone-based workflow produces georeferenced depth maps along structured survey lines, supporting reliable water level monitoring as part of standard mine operations.

- ~15,000 m² pond surveyed without boats
- No personnel in the TSF water body
- Repeatable structured survey lines
- Georeferenced depth maps for water-level tracking





Germany

Academia

Drone-Based Magnetometry Accelerates Archaeological Prospection at the Roman Fortress of Theilenhofen

Researchers from Ludwig-Maximilians University in Munich tested whether drone-based magnetometry could complement traditional ground surveys at the Roman fortress of Theilenhofen in Bavaria. Ground-based magnetic surveys are highly precise but labor-intensive and often constrained by accessible terrain, while large-scale archaeological sites demand both speed and coverage.

The team mounted the SENSYS MagDrone R4 magnetometer onto a DJI M300 RTK with RTK GNSS positioning. Then they used True Terrain Following (TTF) to fly at ultra-low altitudes between 45 and 75 cm above the ground. Drone-collected data across a 3.8-hectare area was filtered using the SENSYS MagDrone DataTool to remove motor and electrical noise and later compared directly against a high-resolution ground-based cesium magnetometer reference dataset.

The drone survey successfully resolved key archaeological features at a fraction of the time required for traditional surveying.

Key Insight

Drone-based magnetometry detected ditches, pits, fireplaces, and stone foundations across 3.8 hectares while flying as low as 45 cm above ground via True Terrain Following. Although ground-based magnetometry still offers the highest spatial resolution, drone surveys delivered the speed and coverage needed to guide subsequent targeted ground investigations.

- 3.8 hectares surveyed by UAV
- Flight altitudes: 45–75 cm AGL
- TTF for ultra-low, terrain-safe flight
- Major Roman features clearly resolved
- Faster, complementary to ground surveys

Indonesia

Mining

Drone-Based Bathymetry Reaches Inaccessible Mining Water Bodies at a Mineral Mining site in Southeast Sulawesi

Oseanland Survei Indonesia conducted a field demonstration of drone-based bathymetry at PT Sulawesi Cahaya Mineral's mining site in Konawe, Southeast Sulawesi. The goal was to test whether a UAV-mounted echo sounder could collect reliable depth data in a swampy mining water body where boats and USVs are difficult or unsafe to deploy due to soft ground, dense vegetation, and shallow, irregular conditions.

The team deployed a DJI Matrice 350 RTK equipped with an ECT D052S echo sounder, integrated through the SkyHub onboard computer and flown using UgCS flight planning software. Predefined flight lines, controlled low-altitude operation, and georeferenced depth logging allowed the team to map the water body entirely from the air, with personnel remaining outside the swampy zone.

Key Insight

A drone-based workflow successfully captured depth variations across a swampy mining water body that boats and USVs could not safely or efficiently reach. The resulting bathymetric map visualized underwater conditions in an area that would be difficult to survey from the surface, supporting safer monitoring, planning, and water management for mining operations.

- Safe operation over swampy, soft terrain
- Georeferenced depth data via ECT D052S
- Faster deployment than boat or USV setups
- Workflow suited to tailing ponds and shallow mining waters





Canada

Academia

Drone-Based GPR and LiDAR Reveal Subsurface Ice in Quebec's Rock Glaciers

SPaRS-Lab at the University of New Brunswick, supported by Measur and SPH Engineering, surveyed rock glaciers in the Chic-Choc Mountains on Quebec's Gaspé Peninsula. Steep slopes, dense subarctic forest cover, and long approach hikes made conventional cart-based or handheld GPR surveys impractical and unsafe, despite the scientific value of these climate-sensitive permafrost features.

The team deployed SPH Engineering's integrated UAV GPR Kit: a Zond Aero LF (100–300 MHz) GPR mounted on a DJI M350 RTK, paired with the SkyHub onboard computer, UgCS flight planning software, and a DJI Zenmuse L2 LiDAR payload. Low-altitude True Terrain Following flights enabled stable radar acquisition over uneven, rocky terrain, while LiDAR generated high-resolution digital elevation models.

The combined dataset produced an integrated 3D model of both surface morphology and internal rock glacier structure.

Key Insight

GPR penetration reached up to ~20 m beneath the surface, revealing inclined reflectors, disrupted layers, and high-amplitude zones indicative of ice-rich permafrost or buried massive ice. The combination of deep GPR imaging and dense LiDAR DEMs (~450 pts/m²) delivered a unified 3D dataset across terrain inaccessible to ground crews.

- ~20 m GPR penetration depth
- ~450 pts/m² LiDAR point density
- Stable low-altitude flight via TTF
- Integrated 3D surface + subsurface dataset

"Without the aerial access capabilities of the remotely piloted aircraft, the type of data that was gathered simply could not have been collected."
— Dr. Kynan Hughson, Department of Earth Sciences, University of New Brunswick



USA

Academia / Oil and Gas

Drone-Based Methane Detection Localizes Leaks at Abandoned Wells in Houston, Alaska

The GeoComputing Lab at the University of Alaska Anchorage built a drone methane detection workflow to tackle the U.S. orphaned well problem: roughly 3.9 million abandoned wells nationwide, with fewer than 1,200 ever measured for emissions. Existing detection methods rely on magnetometry, which fails when steel casings are missing, buried, or surrounded by other metallic debris.

The team used a Laser Falcon TDLAS methane sensor integrated with a drone via SkyHub. After validating the system with controlled methane releases, the team flew ten field missions over three abandoned wells in Houston, Alaska. The well sites were identified by the Alaska Oil and Gas Conservation Commission and surveyed across three separate periods.

Two statistical tests confirmed reliable leak detection in both controlled and real-world conditions.

Key Insight

Controlled-release tests produced zero false positives and zero false negatives at a skewness threshold of 1.5. In the field, methane leaks were detected in 9 of 10 flights. The system continued to detect active leaks even during ongoing remediation work, demonstrating its value for prioritizing the $4.675 billion in federal funding allocated to plug abandoned wells across 28 U.S. states.

- Zero false positives in controlled tests
- 9/10 field flights confirmed leaks
- Detection sustained during remediation
- Method applicable to landfills, pipelines, permafrost

Sweden

Academia

Precise Drone-Based Hydrometry Validated in Vegetated and Flooded River Zones

A 10 km stretch of the Rönne Å River in Sweden was surveyed using a multi-sensor drone system, capturing water level, depth, and flow velocity across shallow, vegetated, and post-flood zones. Led by the UAWOS project consortium and the Technical University of Denmark, the mission tested whether drone-mounted sensors could match ground-based equipment in challenging field conditions.

Equipped with radar altimeters, echo sounders, water-penetrating radar (WPR), and Doppler velocity sensors, the UAVs delivered centimeter-level accuracy under dynamic conditions, including rainfall-induced flooding. The operation confirmed the drone system's reliability and resolution for use in contactless, high-precision hydrometric surveys.

Key Insight

The drone system achieved water surface elevation accuracy within 3 cm, bathymetry accuracy within ±8 cm, and flow velocity deviation below 10 cm/s, even in dense vegetation and unstable weather. This validates drone-based hydrometry as a practical, scalable alternative to wading or boat-based methods in inaccessible or hazardous environments.

- Accuracy: <3 cm
- Bathymetry deviation: ±8–10 cm
- 10 km surveyed in dynamic conditions
- 100% contactless
- Flow velocity resolution: 7.3 mm/s



Switzerland

Academia

Drone-Based GPR Enables Safe, High-Resolution 3D & 4D Glacier Surveys

The University of Lausanne's CRAG group, in collaboration with Utsi Electronics and SPH Engineering, deployed a drone-based Ground Penetrating Radar (GPR) system over the Otemma Glacier in the Swiss Alps. The mission was to safely map the glacier's internal structures and enable time-lapse monitoring in terrain too dangerous for foot surveys.

Flying a DJI M300 RTK equipped with an 80 MHz GPR antenna, the team captured 112 line-km of data across 462 parallel profiles in just four days. The system's compact design, precise GPS, and SPH Engineering's True Terrain Following allowed consistent flight height over steep, unstable terrain, eliminating operator risk and ensuring high-resolution results.

The survey revealed detailed subglacial channels, englacial features, and bedrock layers, supporting both 3D modeling and future 4D glacier monitoring.

Key Insight

112 line-km of data acquired in 4 days with zero operator exposure to glacier hazards.

The drone-mounted GPR system delivered sub-meter accuracy and 100+ m ice penetration, enabling a full 3D subsurface model of the glacier. The high-density coverage (1 m profile spacing, 14 traces/sec) and repeatable TTF-enabled flights make this solution uniquely suited for long-term glaciological monitoring.

- 112 km surveyed in 4 days
- <1 m profile spacing
- 100+ m depth penetration





Austria

Public Safety & Risk Management

Drone-Based GPR Maps Snowpack Variability with 97% Accuracy for Avalanche Risk Forecasting

In the Austrian Alps, GEORESEARCH deployed SPH Engineering's drone-mounted GPR system to assess snowpack variability at the Stubai Glacier. Traditional methods like manual probing or snow pits offer point-based data, but fail to capture localized fluctuations critical for avalanche risk assessments.

The UAV-borne system equipped with a Zond Aero 1000 "NG" antenna captured rapid, high-resolution data over 0.07 km^2 of complex alpine terrain, revealing snow depth variations from under 1 meter to over 4 meters. This spatial insight enabled more precise hazard prediction while eliminating operator exposure in steep, avalanche-prone areas.

With strong agreement between drone data and probe measurements, the study validated UAV-based GPR as a powerful tool for snowpack analysis in dynamic alpine environments.

Key Insight

Snow depth correlation of $R^2 = 0.93$ ($r = 0.97$) confirmed the drone-based GPR system's accuracy, enabling precise mapping of snowpack layers without physical contact. In just one mission, the drone revealed snow depth fluctuations >3 m within a single 0.07 km^2 zone — levels of detail not achievable by traditional probe techniques.

- 0.07 km^2 of alpine terrain surveyed in one flight
- Snow depth variations from <1 m to >4 m mapped
- 97% correlation with probe measurements
- Safe, contactless surveys in avalanche-prone terrain

USA

Mining

Drone-Based Echo Sounding Boosts Safety and Data Quality in Coal Mine Reclamation

Patriot Environmental adopted SPH Engineering's UAV-based echo sounder solution to modernize water volume surveys at coal mine reclamation ponds in Eastern Texas. Traditional sonar boats struggled in corrosive reclaimed waters, posed safety risks on steep pond edges, and required constant manual oversight.

By transitioning to a DJI M300 drone with a tethered ECT400S echo sounder and UgCS flight planning software, the team achieved safer, faster, and more reliable operations. Field crews no longer had to walk pond perimeters or manually steer equipment. Instead, they controlled the survey remotely from a fixed position.

The drone-based system also enabled surveying in windy conditions and delivered significantly higher data density for volumetric analysis.

Key Insight

Drone deployment eliminated operator exposure to hazardous terrain and increased data point density for better volumetric accuracy.

Surveys that previously required manual boat control in harsh, chemically treated waters were completed faster and with fewer equipment failures. Higher wind tolerance also meant more consistent scheduling and reduced downtime.

- Higher data resolution
- Reduced labor
- Fewer safety risks
- Works in higher winds





Canada

Consulting

Urban Systems Reduces Bathymetric Survey Time by 75% with Drone-Based Echo Sounder

Urban Systems, a Canadian consulting firm, replaced manual boat-based bathymetry surveys with a UAV-mounted echo sounder system from SPH Engineering. The team used this solution to survey storm ponds and river inlets for sediment monitoring and volumetric analysis, focusing on improving access, safety, and data reliability.

Previously, bathymetric surveys required full-day boat operations and 20+ hours of manual data cleanup. By switching to the ECT D052S echo sounder integrated with UgCS and Hydromagic software, Urban Systems completed surveys in under two hours, reduced post-processing to less than four hours, and eliminated the need for risky, labor-intensive fieldwork.

The new approach enabled the team to increase throughput, avoid repeat visits, and extend operations to sites that were previously inaccessible or unsafe.

Key Insight

Bathymetric survey field time was reduced by 75%, and post-processing time dropped by 80% from 20 hours to under four per site. UAV-mounted echo sounders provided more complete, higher-quality data while minimizing safety risks and avoiding redundant data collection.

- 75% less field time
- 80% less processing time
- Zero water entry
- No GNSS on water
- Complete data in 1 visit



UAE

Construction & Engineering

Airborne GPR System Detects Subsurface Water Pipes with High Spatial Accuracy

At a controlled test site near Dubai, Dynatech Innovations and SPH Engineering demonstrated the effectiveness of airborne GPR for underground water pipe detection. Using a DJI M350 RTK UAV and Zond Aero 500 GPR, the team conducted 16 flight lines over synthetic turf with 1-meter spacing, targeting buried irrigation lines.

Processed in Geolitix and GeoHammer, the GPR profiles revealed consistent hyperbolic reflections aligned across profiles. Despite the typical difficulty of detecting plastic pipes due to weak radar signatures, multiple pipe locations were identified at depths ranging from 0.4 to 0.7 meters. Visualizations in QGIS confirmed pipe layout estimations across the grid.

This test underscores the system's potential for non-invasive, high-resolution utility detection, especially in environments with favorable soil conditions and flight configurations.

Key Insight

Subsurface plastic pipes were successfully detected at 0.4–0.7 m depth, using airborne GPR, which is a notable achievement given their typically low dielectric contrast. With 16 flight lines, 1 m spacing, and automated processing in Geolitix, the survey produced clean profiles, spatially aligned hyperbolas, and detailed slice maps, allowing for confident utility layout estimation.

- 16 flight lines at 1 m spacing
- Plastic pipes detected at 0.4–0.7 m depth
- Clean profiles and slice maps for layout estimation

Chile

Government

Chile's Ministry of Public Works Enhances Water Resource Management with Drone-Based Bathymetry

In response to critical drought conditions, Chile's Ministry of Public Works (MOP) deployed SPH Engineering's UAV-based echo sounder system to survey four major reservoirs in the Coquimbo region. The goal was to obtain high-resolution bathymetric data to support better water distribution, flood forecasting, and drought response planning.

Using a DJI M300 RTK drone, equipped with the ECT 400 echo sounder and photogrammetric sensors, the team generated detailed water depth maps and precise volume calculations across Embalse Cogotí, Puclaro, Recoleta, and La Paloma. Mission planning in UgCS and processing in Hydromagic ensured data quality and workflow efficiency.

The survey revealed dramatic seasonal volume changes, providing essential insight for agricultural and municipal resource decisions and laying the groundwork for long-term sedimentation and climate impact monitoring.

Key Insight

Reservoir volumes increased up to 15.3 million cubic meters over four months, tracked via UAV-enabled monitoring. For example, Embalse Cogotí rose from 1.14 to 16.46 million m^3, directly influencing water allocation decisions. This operational shift eliminated manual measurement delays and improved both spatial coverage and accuracy.

- Volume changes up to 15.3M m^3
- Faster, more accurate monitoring
- Data guiding drought response





Netherlands

Offshore Energy & Coastal Infrastructure

UAV Magnetometer Closes Survey Gap in Shallow-Water Cable & Pipeline Detection

To locate offshore wind farm export cables and associated infrastructure, Shore Monitoring & Research conducted a coastal magnetic survey using a dual-platform strategy. While towed marine magnetometers (Geometrics G-882) were effective in deeper waters, traditional methods struggled in the critical nearshore zone due to vessel access and positioning limitations.

To address this, SPH Engineering's UAV-mounted MagNIMBUS magnetometer was deployed for shoreline and shallow water areas. The drone flew precise grid lines using RTK-GNSS and autonomous line planning, delivering accurate, high-resolution data up to 100 meters from shore.

Overlapping datasets from the drone and boat-mounted systems enabled cross-validation and seamless coverage from land to sea, revealing the primary export cable, an additional AC cable, and several unexpected anomalies across the full survey area.

Key Insight

The UAV system enabled precise magnetic surveys in water <5 m deep, where traditional towed systems become unreliable. Drone data showed higher positional accuracy and better line keeping, simplifying processing and improving target confidence, especially critical for nearshore cable corridors and UXO risk zones.

- Coverage from shoreline to 100 m offshore
- Export cable, AC cable, and anomalies detected
- Accurate surveys in <5 m depths
- Dual-platform overlap verified results

Sean Zandbergen from Shore Monitoring & Research commented: "We were happy with the results based on the overlap of the two datasets. Using a UAV magnetometer in this industry is a bit new.. It's easier to process the drone data since the positioning is so much better/ more accurate. The line keeping while towing the submersible magnetometer system is challenging, while the drone autonomously flies an accurate line plan based on RTK-GNSS. Therefore, it's easier to line up consecutive lines of the survey.

Colombia

Mining

Enhancing Mine Safety and Sediment Monitoring with UAV GPR and Echo Sounder Technology

At El Cerrejón, one of the world's largest coal mines, SPH Engineering and DATUM Ingeniería SAS conducted a comprehensive field operation using drone-mounted Ground Penetrating Radar (GPR) and a dual-frequency echo sounder system. The mission focused on detecting underground hazards and assessing reservoir sedimentation, both critical for maintaining operational safety and efficiency.

Using a Zond Aero LF GPR mounted on a UAV, the team identified potential subsurface burning coal zones often hidden below operational surfaces where heavy machinery works. Simultaneously, an ECT D052S echo sounder was used to map depth and sediment layer thickness in a mine water reservoir, supporting flood risk management after heavy rains.

The project also demonstrated the value of UgCS flight planning and DroneGIS for streamlined data management, visualization, and future AI integration.

Key Insight

Subsurface hazards were detected in coal transport zones, enabling preemptive safety measures. Additionally, sediment layer thickness was successfully mapped, informing maintenance plans for water reservoirs. This dual-survey approach showed the potential of UAV technology to improve mine safety, environmental resilience, and decision-making efficiency.

- Hazards detected in coal zones
- Sediment thickness mapped
- Safety and planning improved



USA

Stormwater & Urban Water Management

Mohawk College and City of Hamilton Boost Stormwater Survey Accuracy with Drone-Mounted Echo Sounder

To improve the efficiency and safety of stormwater pond surveys, Mohawk College's Unmanned Remote Sensing Innovation Centre, in collaboration with the City of Hamilton, deployed a DJI M300 RTK drone equipped with a SPH Engineering ECT 400S echo sounder.

The system replaced labor-intensive manual boat surveys across hard-to-access urban ponds. Using autonomous flight planning in UgCS, Hydromagic data processing, and RTK-GNSS positioning, the team generated accurate 3D bathymetric models. The data supported critical dredging decisions and compliance with environmental regulations.

A second drone with a photogrammetry camera was used in tandem to capture surface terrain, enabling full above- and below-water volumetric modeling.

Key Insight

Volume deviations between sonar, LiDAR, and photogrammetry were minimal (<10%), confirming that UAV-based sonar is a reliable, scalable, and safer alternative to manual depth measurements. For one site (SWMF #74), pre-dredge permanent pool volume using sonar was 1,140 m^3, compared to 1,230 m^3 (photogrammetry) and 1,360 m^3 (LiDAR) showing strong alignment across all methods.

- Full-coverage depth mapping
- <10% deviation across methods
- Reduced survey time
- Improved safety (no water entry)





Netherlands

Waste Management & Emissions Monitoring

Drone-Mounted Laser Falcon Enables Methane Leak Detection at Dutch Landfills

In the Netherlands, Antea Group Nederland and Aerial Intelligence used SPH Engineering's Laser Falcon methane sensor integrated with a DJI M300 RTK drone to detect methane emissions across landfill sites. The team aimed to identify leak zones in the landfill covers, analyze emission variations, and lay the groundwork for calculating annual methane output.

Over three days, the drone system conducted 24 automated flights, collecting ~55,000 methane data points across more than 30 hectares. The True Terrain Following (TTF) feature ensured altitude stability during low-level flights, minimizing measurement disturbances caused by terrain changes and air turbulence. The resulting dataset was processed into detailed emission maps and overlaid on orthophotos within a GIS environment.

Key Insight

55,000 data points collected across 30+ hectares in just 3 days, using UAV-based methane detection. The system demonstrated high sensitivity, precision, and flexibility, supporting both scheduled and on-demand inspections with minimal ground disruption and maximum spatial insight.

- High-density methane measurements
- TTF-enabled flight stability
- GIS-integrated output
- Flexible scheduling for variable field conditions

"To gain experience, we conducted many tests and mastered the technology. We did this by performing tests in controlled environments, after which we always adjusted 1 parameter. We compared the results of this and then included them during the data collection for this project. Overall, we are very positive about using this combination of technologies. It enables us to collect data efficiently, accurately, securely, and carefully, " comments Nick Cornelissen from Aerial Intelligence.



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