INTERMAP
Answers Now™

NEXTMAP®
P-Band

Airborne Radar Imaging Technology

Intermap is proud to announce the latest advancement of their Synthetic Aperture Radar (SAR) imaging technology. Leveraging over 15 years in research, development, and operation of P-band radar systems, Intermap's next generation radar system is the world's most efficient high-resolution multi-frequency remote sensing platform. Intermap's P-band system is fully polarimetric and operates simultaneously with X-band to provide both detailed sub-canopy information, as well as high-resolution imagery and interferometry. Operating at altitudes of up to 30,000 feet, the system can collect over 7,000 km2 per hour. The high-altitude airborne system is available for:

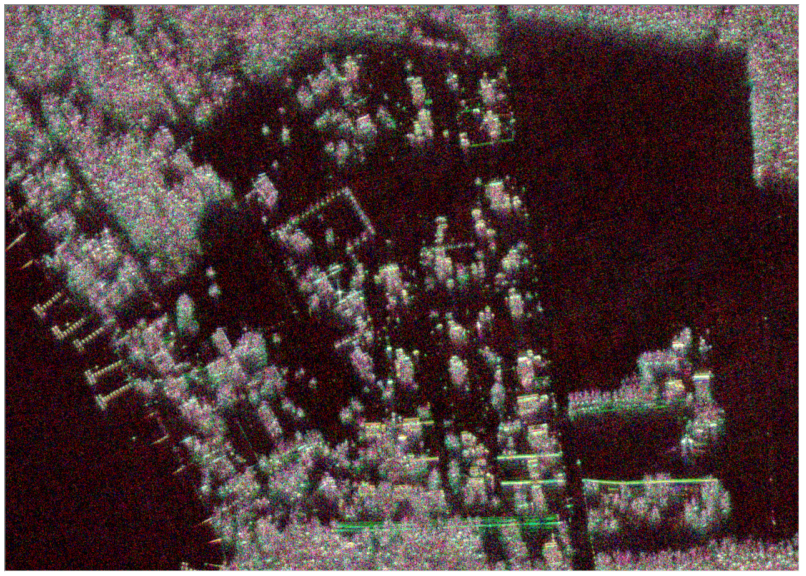
Key Benefits & Features

- Infrastructure identification above and below foliage cover
- Land cover classification and usage
- Security monitoring through detection of command wires, trip wires, improvised explosive devices (IED), and unexploded ordnance (UXO)
- Monitoring erosion and estimation of soil moisture levels
- Change detection and intelligence, surveillance, and reconnaissance (ISR) to automatically detect, identify, and classify features over time
- High-resolution imagery and elevation models (through simultaneous X- and P-band collection)

Change Detection

The use of fully polarimetric P-band imagery for change detection has two key advantages over traditional change detection using other sensor technologies. The first is the ability to detect changes beneath foliage cover and even below the ground surface. Targets that would otherwise be unseen by other sensors can be detected readily using the penetrating power of P-band. Through change detection, these hidden targets pop out with remarkable clarity when they are introduced or removed from a scene.

The second major benefit comes from the polarization response at P-band. By measuring the polarimetric response and scattering behavior, additional distinguishing physical characteristics of the targets can be observed and exploited. This translates into more targets that can be observed and more ways of measuring whether those targets have changed in some way. Unlike traditional change detection that can only tell you if a target has entered or left the scene, P-band polarimetric change detection can tell you whether targets that remain in the scene have new or different properties (e.g. moisture content).



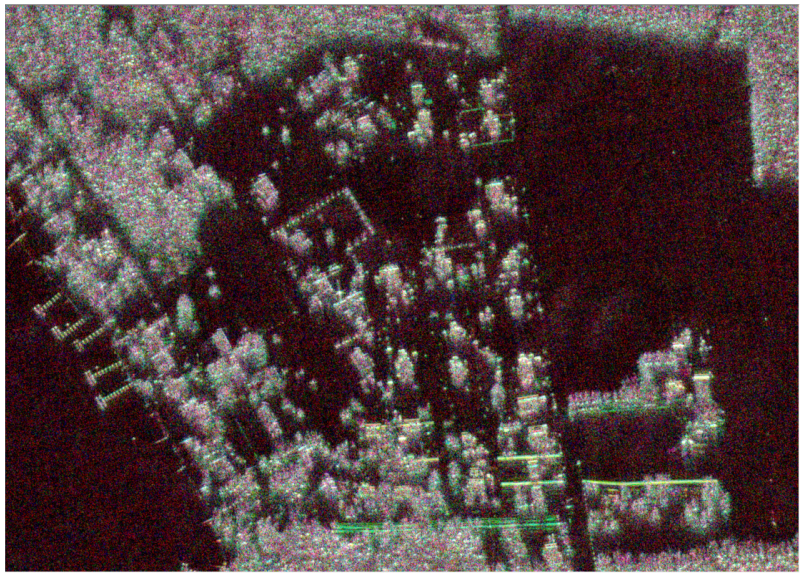


Image 1 & 2: Multi-polarization P-band image over two different days shown in false-color. HH is represented in the red channel, VV in green, and HV in blue. The top image was acquired on April 14, 2017 and the bottom image on April 19, 2017.

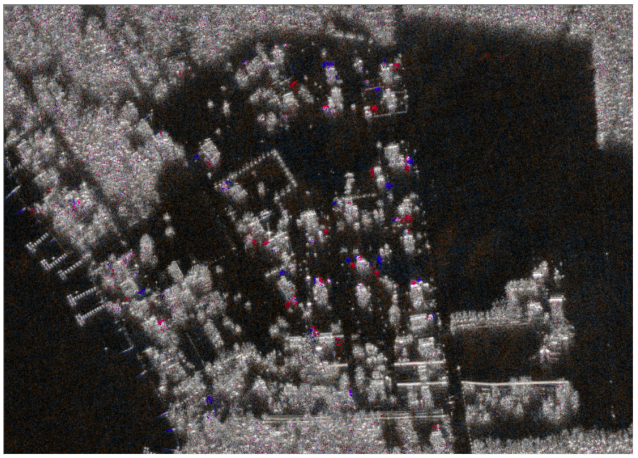
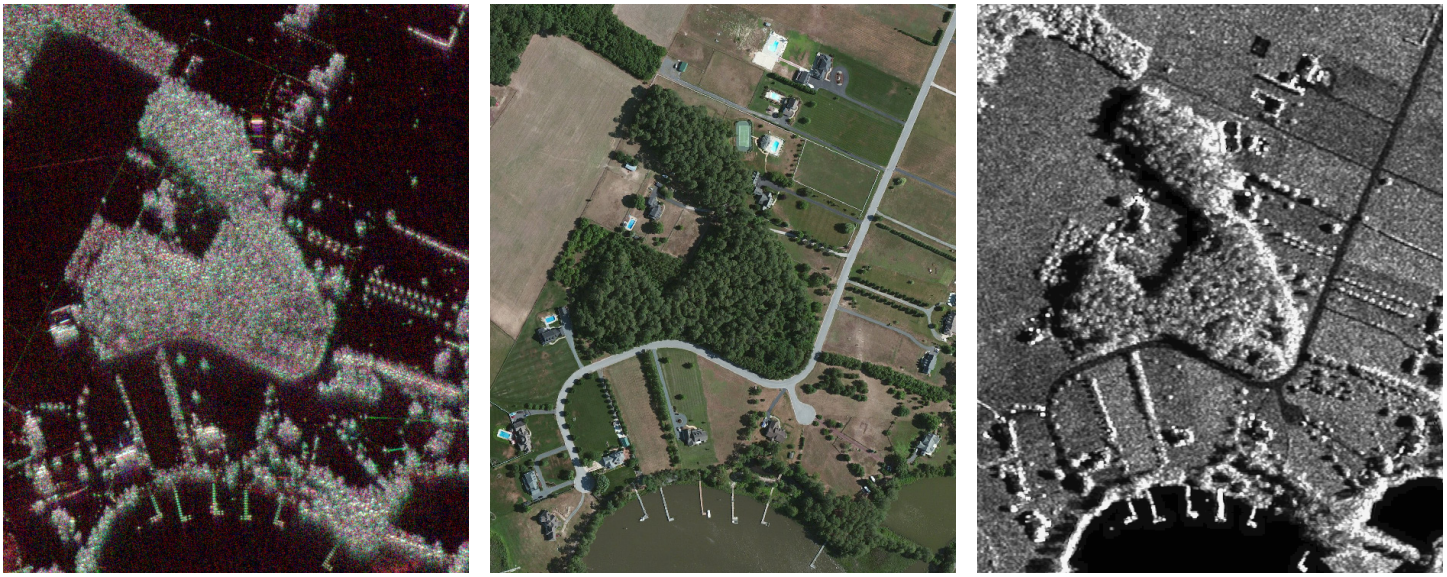


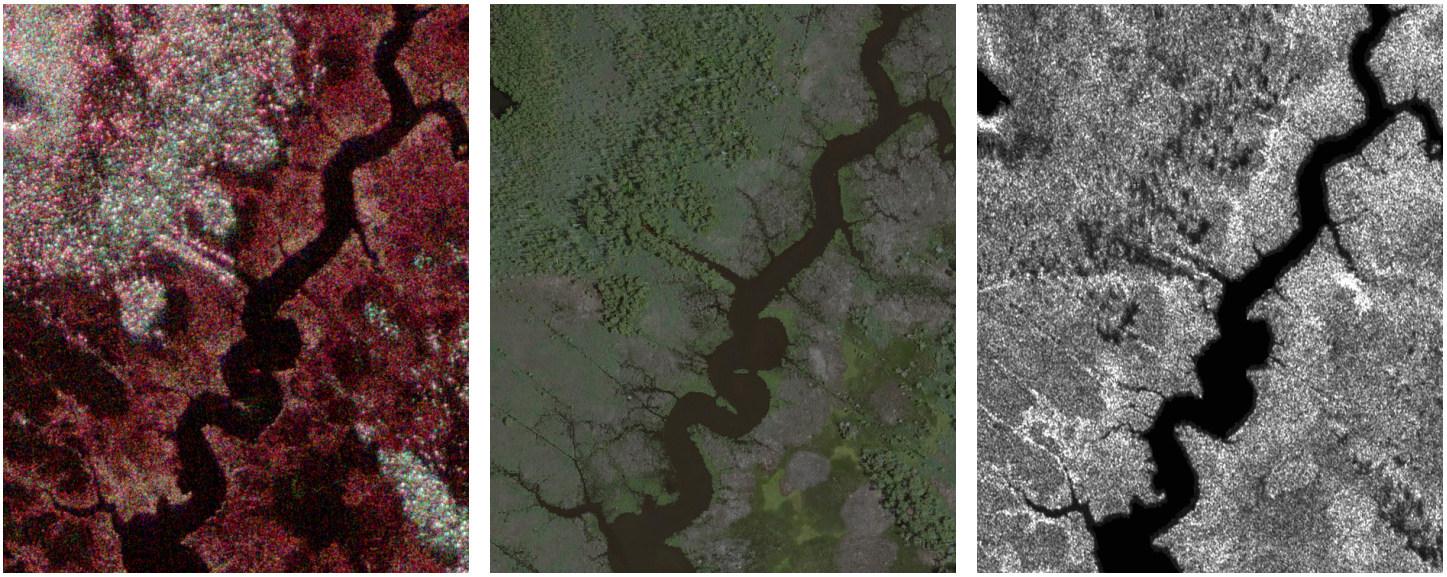
Image 3: Change detection image shows new objects in red and removed objects in blue. Movement of vehicles as well as other objects can be readily identified.

Hydro and Sub-Canopy Mapping

P-band radio waves penetrate through multi-canopy vegetation allowing identification of natural and man-made features that are hidden from view when using photography or LiDAR mapping techniques. Objects and features in the imagery can be identified using polarization and image response signatures. This allows for tactical awareness of objects and features such as vehicles, fences, buildings, trees, roads, rivers, and more. Due to the low frequency of P-band signals, they are able to penetrate ground surfaces for detection of subsurface structures and infrastructure. Depth-of-penetration and detection capability depends on many factors, including soil type and soil moisture content, signal power, incidence angle of the sensor, and the use of polarization.



Above images from left to right: Multi-polarization P-band, optical, and X-band images. Man-made structures are more easily identifiable in the P-band image compared to the other images. Features like wires can be found in the lower right portion of the P-band image (shown in green). A structure below the canopy can also be observed in the extreme lower right corner of the scene.



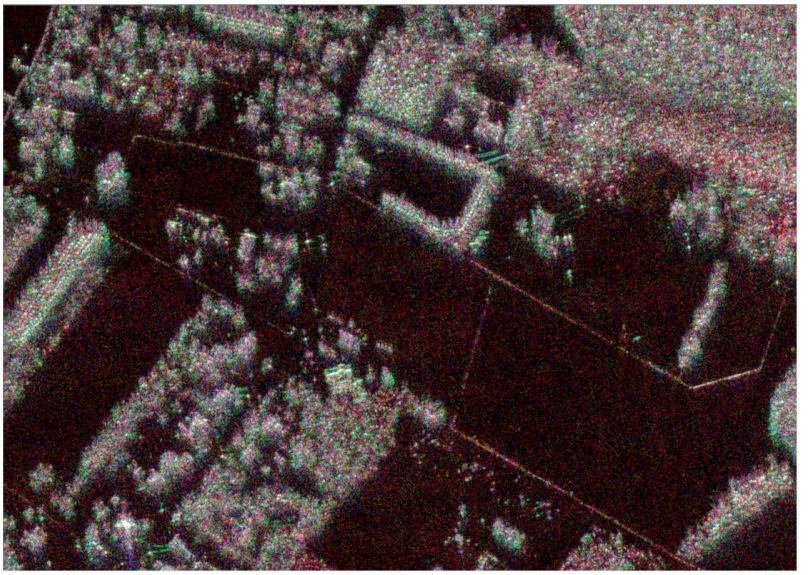
Above images from left to right: Multi-polarization P-band, optical, X-band images. P-band more clearly differentiates between the types of vegetation. The forested area on the upper left portion of the scene is more easily distinguished from the surrounding grassland in the P-band image than in the optical or X-band images.

Wires and IEDs

By collecting P-band imagery in a surveillance mode through multiple orientations, threat items such as IEDs and command wires can be detected. Command wires, as well as other surface or subsurface wires are detected using the polarimetric response in the imagery. Roadside IEDs, munitions, and other threat items can be quickly identified using change detection techniques. By utilizing P-band SAR in this manner, it allows for proactive detection and response to threat items.

Image 1: Buried simulated IED, marked with plastic pin ready for detection flights.

Image 2: Simulated IEDs used in detection flights.



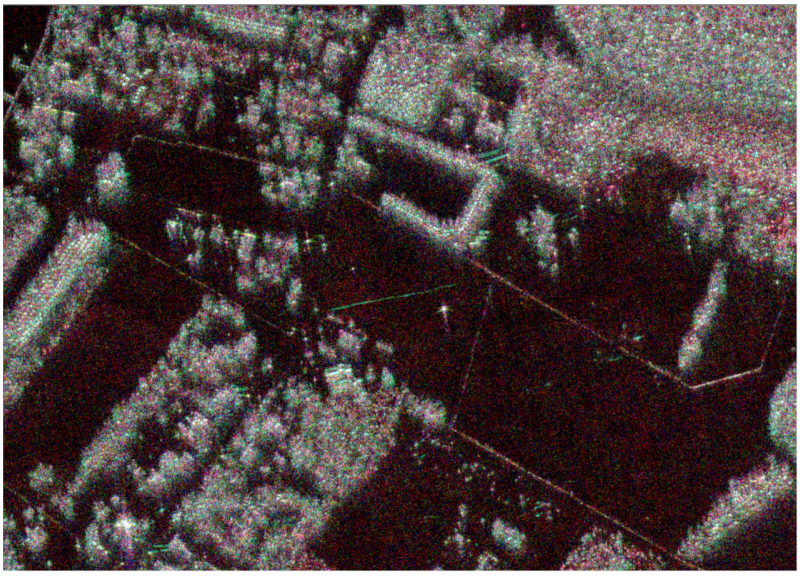


Image 3 & 4: Multi-polarization (HH, VV, & HV) P-band image. HH is represented in the red channel, VV is represented in the green channel, and HV is represented in the blue channel. The top image was acquired on April 14, 2017 before IED targets were placed. The bottom image was acquired on April 19, 2017 after simulated IEDs were buried. Note the bright target in the center of the image.

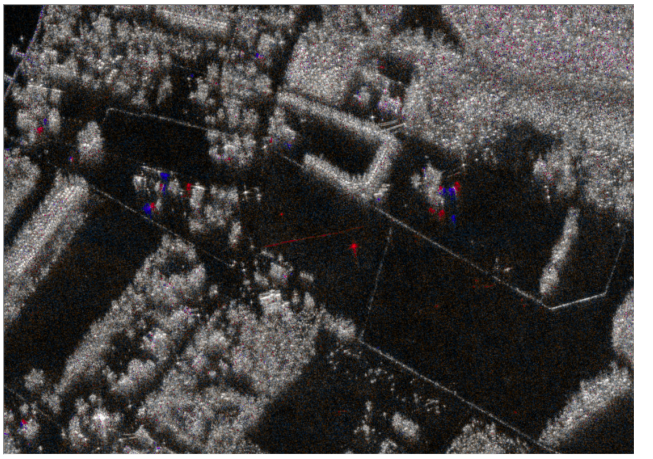


Image 5: Utilizing polarimetric imagery and change detection, IEDs and command wires were identified. The wire is only visible in HH polarization and would not be detectable with other technologies.