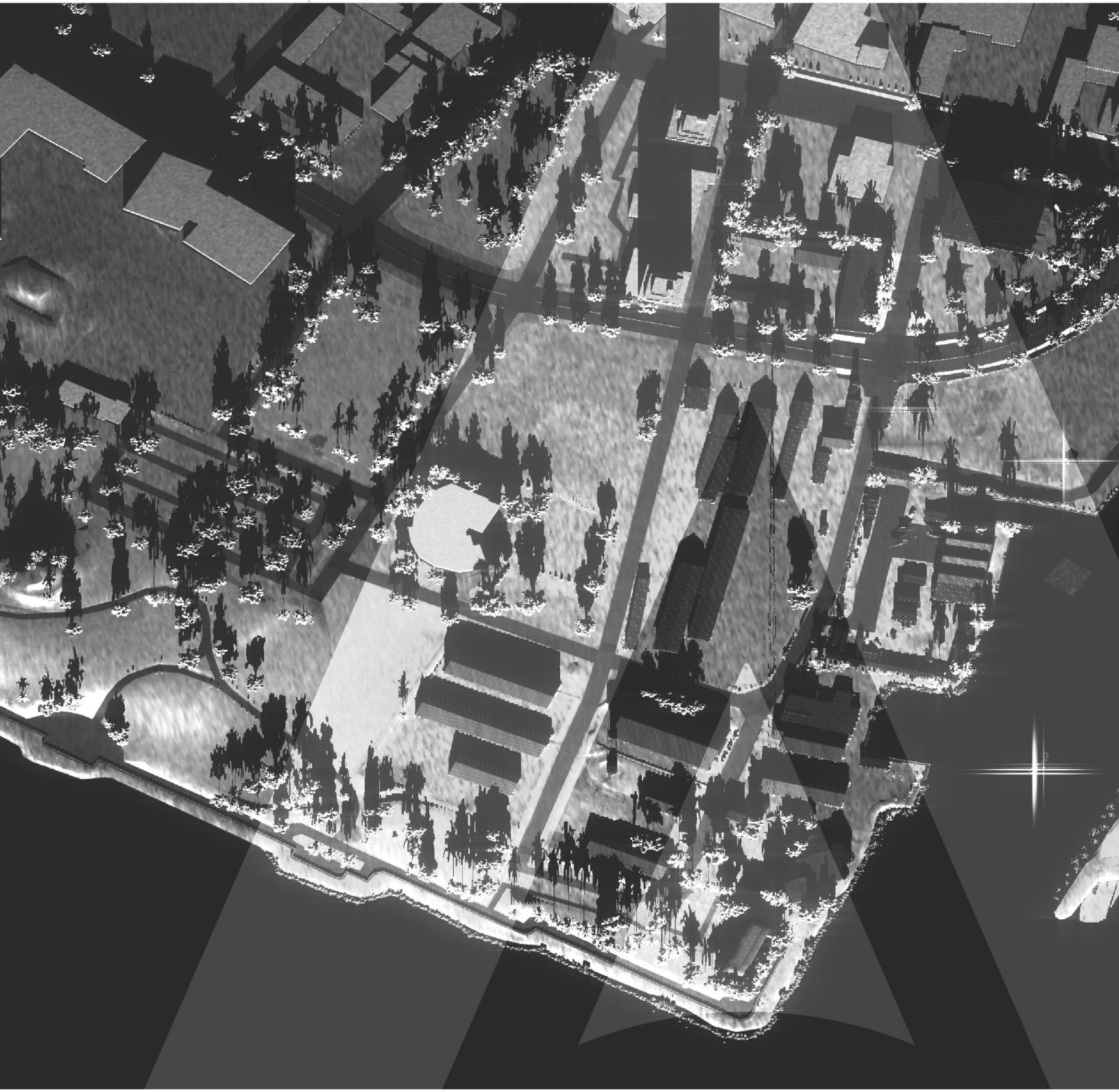
MAK TECHNOLOGIES

RadarFX SAR Capabilities



Version 1.4

ST Engineering North America

RadarFX SAR Capabilities

RadarFX SAR is a feature rich imaging sensor technology. This document describes its capabilities.

RadarFX SAR - Synthetic Aperture Radar Simulation

Radar-Ready Simulation

Synthetic Aperture Radar, or SAR, is a side-looking radar system that utilizes the flight path of an airborne platform to simulate an extremely large antenna or aperture electronically, and from that generate high-resolution remote sensing imagery.

RadarFX SAR is a software simulation that produces SAR images of a simulated environment that can be populated with simulation activity (see VR-Link and VR-Forces). This system allows you to develop training applications for reconnaissance, surveillance, and targeting that benefit from the unique characteristics of SAR images without actually deploying an airborne system.

RadarFX SAR supports both Strip SAR, in which the track direction is linear, and Spot SAR, in which the track direction rotates around a fixed point on the ground. It also supports inverse synthetic aperture radar (ISAR).

RadarFX SAR is a great value for highly accurate, commercially available, radar image generation.

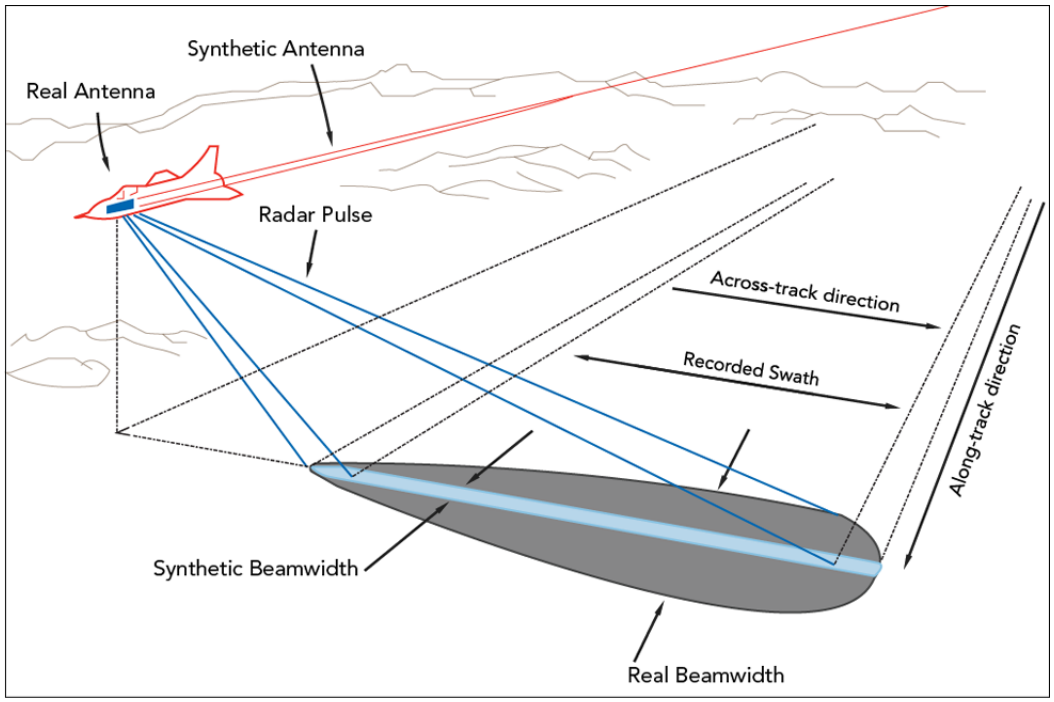


Figure 1. Synthetic Aperture Radar

Forged in Partnership — A Smart Marriage of Physics and Graphics

RadarFX SAR combines JRM Technologies' proven physics-based signature simulation with VR-Vantage's advanced rendering architecture. RadarFX SAR produces accurate SAR scenes using radar returns from the terrain and radar cross sections from vehicles, munitions, and natural and cultural features. The resulting scenes are served to your applications to be presented to users in the proper training context. One RadarFX SAR can supply images for any number of client applications that request SAR images.

Easy Integration into Your Simulation Architecture

RadarFX SAR Server is, as its name implies, a server. That means that you install it on a computer on your network and it services requests from other applications that need SAR images. The product includes a simple-to-use software toolkit to make an easy job of embedding SAR simulation into your applications.

RadarFX SAR also includes an example of using the toolkit to create a client application.

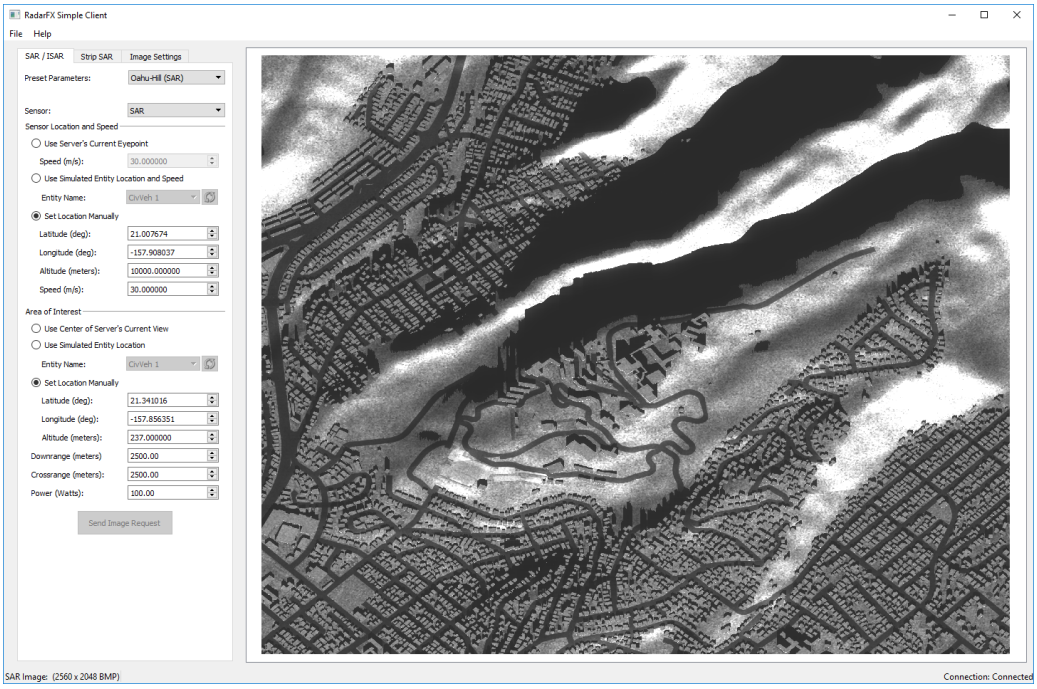


Figure 2. SAR image in RadarFX SAR Simple Client

Physically Accurate SAR Scenes

RadarFX SAR Server is built on top of JRM Technologies' proven physics-based signature simulation. RadarFX SAR synthesizes physics-based signatures on-the-fly (OTF) from a single material-property encoded 3D database of terrain, cultural features, atmosphere and targets.

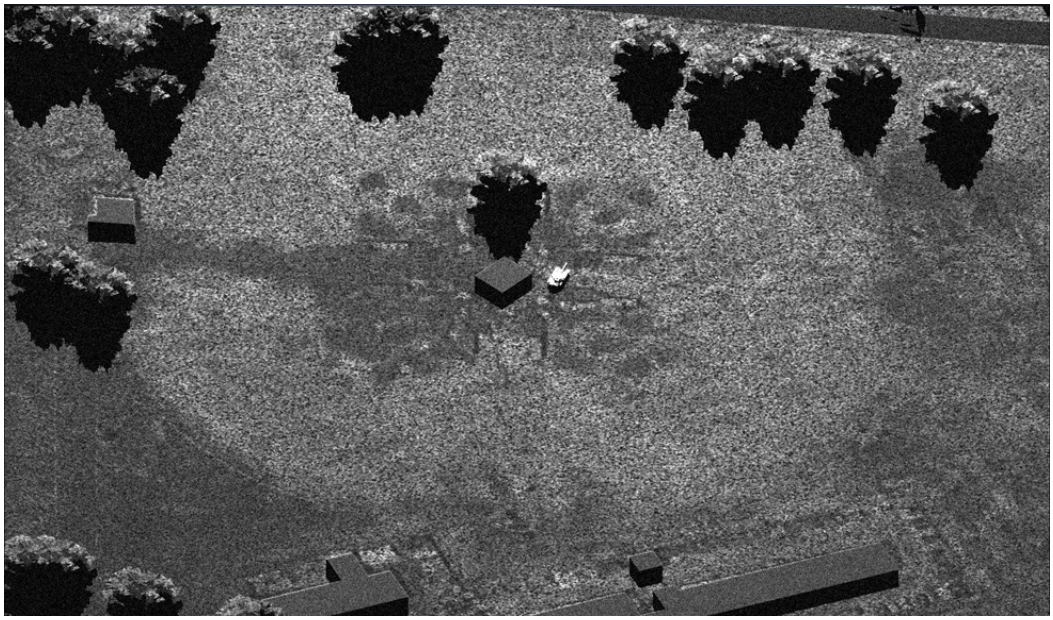


Figure 3. RadarFX SAR image

Applications of SAR

Synthetic Aperture Radar produces images of high-resolution at great distances, that appear to be taken from above — making a nice top-down view like a satellite scene. Since the radar pulses are not significantly disturbed by the weather and do not need daylight to make an image, SAR is particularly useful for Surveillance, Reconnaissance, and Targeting.

- Sensor Operators — RadarFX SAR can be used in applications to teach sensor operations within manned or unmanned aircraft vehicles/systems (UAV/UAS).
- Command, Control, Intelligence training — where images from the SAR server are used to provide battlefield information to commanders and their staff.
- Research & Development — where engineers use RadarFX SAR to model the effects of using different sensor characteristics (e.g. varying wavelengths, pulse widths, etc) to evaluate suitability of use or concepts of operation of different SAR configurations.

Inverse Synthetic Aperture Radar (ISAR)

RadarFX SAR supports ISAR. ISAR uses the movement of a target entity to generate a radar image instead of the movement of the emitter (as is done by SAR). It is predominantly used for maritime purposes.

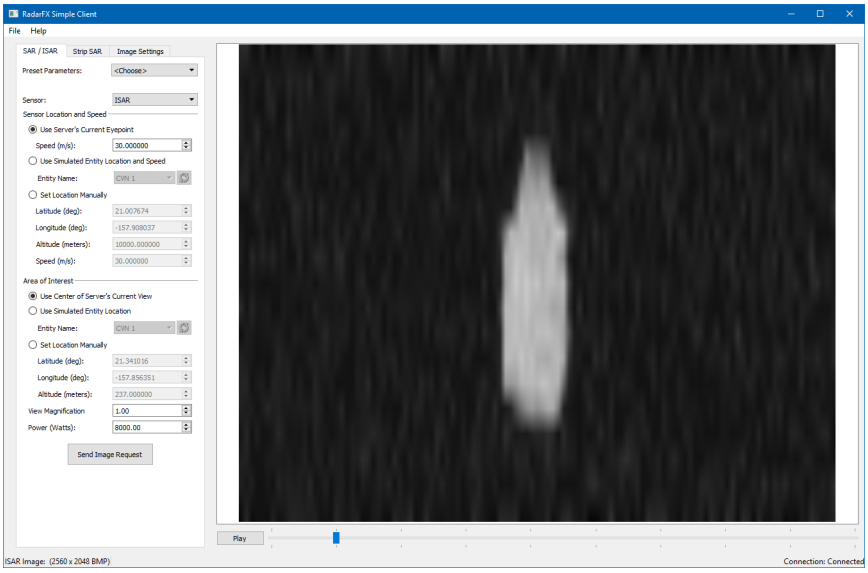


Figure 4. ISAR image in RadarFX SAR Simple Client

Correlated with Infrared, Night Vision, and OTW Scenes

Because RadarFX SAR runs on the same spectral, material-property-encoded terrain and target database as is used for EO/IR wavelengths, the results are automatically fully correlated with the other sensor modes (for example, NVG, MWIR, LWIR) in the SensorFX imaging sensor simulations. A default set of radar cross section data is provided to represent each simulated entity and you can add fidelity if you have your own RCS files.

Signature Effects

RadarFX SAR includes a wide variety of radar imaging effects including:

- SAR Shadows.
- Leading edge brightness.
- Down-range/Cross-range resolution effects.
- RF path attenuation, atmospheric scattering, and absorption noise.
- Target radar cross-sections from imported RCS or FIELD files.
- Component scattering and coherent summation using Jones Matrix (for resonances and nulls)
- Polarization.
- Terrain areal RCS from Ulaby-Dobson parameters embedded in spectral material property files.
- Choice of gain distribution type and directivities, for transmitter and receiver separately.
- Sensor system noise as function of bandwidth and temperature.
- Doppler spatial effects.

Sensor Controls

RadarFX SAR provides control over the following sensor parameters:

- Frequency (GHz)
- Pulse width (u-secs)
- Pulse repetition frequency-PRF (Hz)
- Transmitter polarization angle
- Receiver directivity
- Receiver polarization angle
- Integration path length (m)
- Transmitter power (W) and max power (W)
- Antenna gain
- System temperature
- Saturation S/N ratio
- Gain pattern
- Display type

RadarFX Capabilities

Frequency Ranges

RadarFX SAR supports the following bands:

- L-band : 1-2 GHz
- S-band : 2-4 GHz
- C-band : 4-8 GHz
- X-band : 8-12 GHz
- Ku-band : 12-18 GHz
- Ka-band : 30-40 GHz
- W-band : 90-100 GHz

Image Formats

RadarFX SAR supports the following image formats:

- NITF
- PNG
- Bitmap
- Raw
- JPEG

Export Control

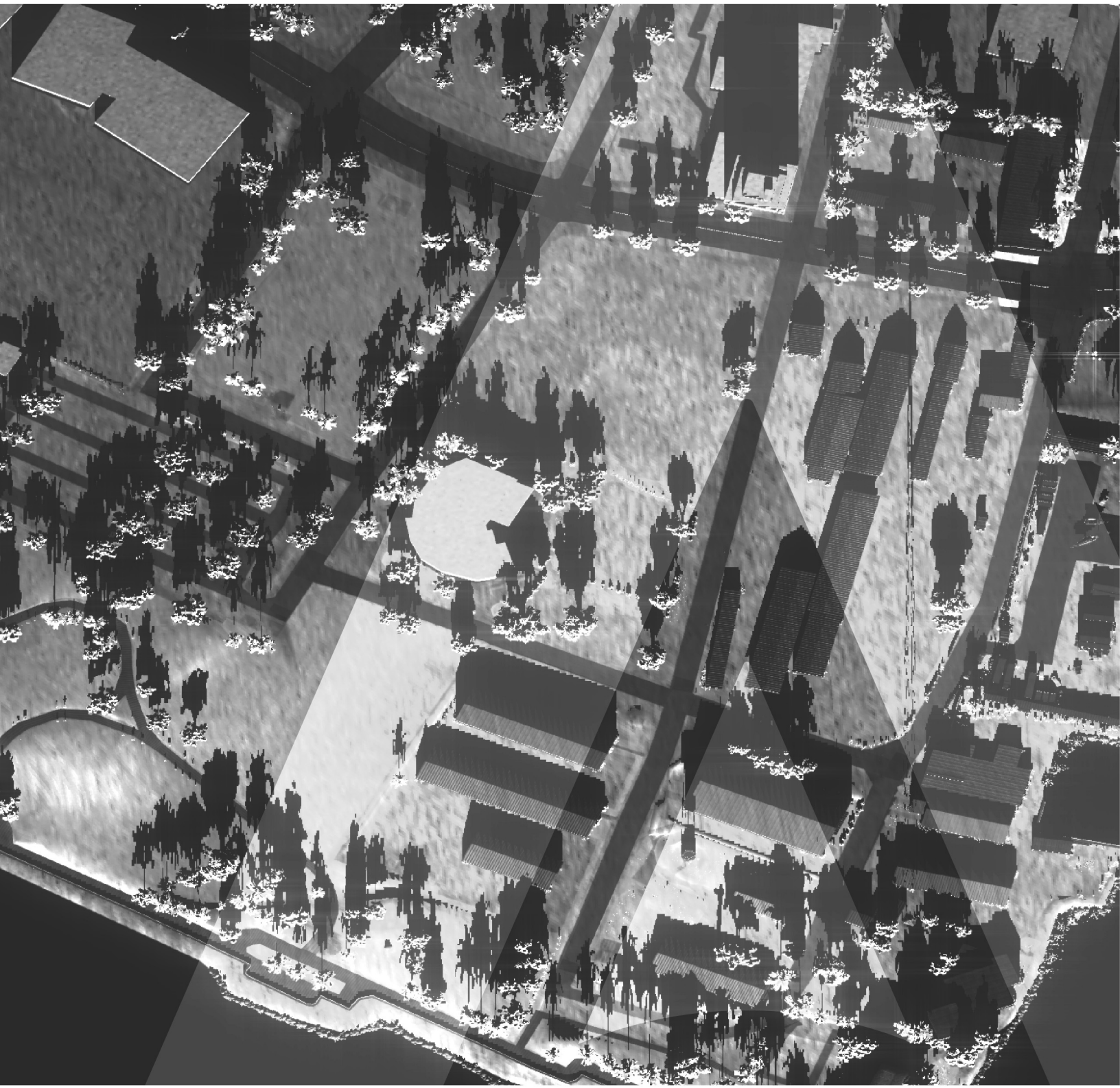
RadarFX SAR is subject to the jurisdiction of the Department of Commerce Export Administration Regulations (EAR99). As such, it is exportable without obtaining an export license. Please be advised that as a purchaser of RadarFX SAR, you are responsible for export, re-export, resale and transfer in accordance with the EAR 15 CFR, and as may be applicable, ITAR 22 CFR 120-130, in addition to any commercial licensing agreements between the parties.

Superior Technical Support

At MAK, technical support is not just an afterthought. Our reputation for supporting our customers is one of the key reasons that people choose our products. When you call or email us with questions, you speak directly to our product developers who know the software inside and out. When you buy MAK's products, you can be sure that MAK will be in your corner as you work towards successful completion of your HLA/DIS project. We've even been known to be on the phone with customers during their HLA certification process, or during key events.

When someone reports a bug, our engineers are quick to provide a patch or workaround, meaning you will not have to wait for the next release to have your problem addressed.

With maintenance, you are entitled to upgrades when they are released. Typically, new releases not only add support for the latest versions of RTIs, the RPR FOM, HLA Specifications, and so on, but also try to maintain compatibility with older versions as well.



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