

## Real-time Radar Sensor Scene Simulator

*OSV-Radar™ is JRM's physics-based, real-time RF sensor scene simulator. Utilizing the popular OpenSceneGraph toolkit to load materially-encoded targets and terrain, OSV-Radar integrates JRM's SigSim and SenSim run-time libraries to predict radiometrically-correct 2D radar sensor imagery, under arbitrary weather conditions and spatio-temporal viewing locations.*

*OSV-Radar is available as a binary application for Windows and Linux OS. An SDK version is also available with source code examples to provide a fully configurable and scalable radar solution.*

### Physics-Based

OSV-Radar synthesizes physics-based signatures on-the-fly from a single material-property encoded 3D database of terrain, cultural features, atmosphere and targets. User-defined physical transmitter & receiver parameters (carrier frequency, PW, PRF, polarizations, gain distributions, power, etc.), and complex, polarized RCS data for each entity and material type, combined with atmospheric transmission, refraction, & noise, are all employed to compute the at-aperture received power density. Entity motion and weather/wind produce corresponding Doppler effects. Finally, energy-conserving binning algorithms duplicate real radar electronics operations to form the final image. A new vehicle RCS/scatter-center generation tool is now also available.

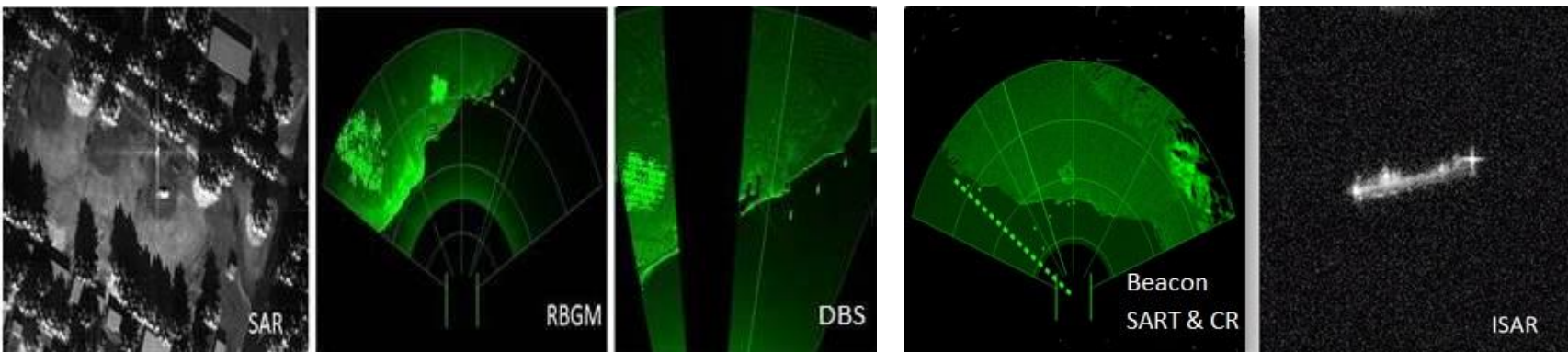


### Fully Correlated

Because OSV-Radar runs on the same spectral, material-property-encoded terrain and target database used for EO/IR wavelengths, the results are automatically fully correlated with the other OSV sensor modes (e. g. NVG, MWIR, LWIR).

### Multiple Modes

OSV-Radar supports a variety of active mode outputs, including SAR (strip and spot), ISAR, Wide-Area Scan with PPI display, DBS (Sector, Patch, and SAR), Sea Search (beacon and SART), Terrain Avoidance, Moving Target Indicator (MTI), Clutter Reduction (CR1 & CR2), and numerous Air to Air modes. OSV-Radar has full support for A/G and A/A modes consistent with systems such as the APG-65. Terrain areal RCS parameters are stored in the same material data files as are used in EO/IR modeling. RF propagation is based on RADTRAN calculations, using the same atmospheric profile specification as for MODTRAN.



\*Products contain no defense articles, classified, or export controlled (ITAR) data.

## Signature Effects

OSV-Radar includes a wide variety of real-time effects including:

- SAR & RBGM with Shadows & Leading edge brightness
- Down-range/Cross-range resolution effects
- Entity motion and wind-driven Doppler
- RF path attenuation, refraction, atmospheric scattering, and absorption noise
- Vehicle radar cross-sections from imported RCS, FIELD, or scatter center files
- Terrain areal RCS from Ulaby-Dobson parameters embedded in spectral material property files (JRM MTL)
- Complex scattering and coherent summation
- Polarization
- Choice of gain distribution and directivities, for transmitter and receiver separately
- Sensor system noise as function of bandwidth and temperature
- Doppler spatial offset and blur
- Doppler coloring
- Gibbs Ringing Phenomena

## RCS/Scatter-Center Generator Now Available

- Imports materially-encoded 3D entity geometry.
- Computes Stratton-Chu integrals in a multiply-scattered, photon-mapped SBR environment, via GPU raytracing (nVidia SceniX/CUDA), with weighted k-means post-clustering.
- Computes polarized, coherent RCS and Scatter Center (SC) sets over all orientations at user-defined frequency bands.

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## Actual Radar Image

## OSV-Radar Image



## Sensor Controls

OSV-Radar allows control over the following sensor inputs:

- Carrier frequency (GHz)
- Pulse width ( $\mu$ s)
- Pulse repetition frequency-PRF (Hz)
- Transmitter polarization angle
- Transmitter gain pattern & directivity
- Receiver polarization angle
- Receiver gain pattern & directivity
- Integration path length (m)
- Transmitter power (W)
- System temperature
- Saturation S/N ratio
- Display type (power, effective RCS)
- PPI sweep rate, contact & doppler threshold
- Doppler color-coding
- Beacon SART & CR

