

Real-time signature synthesis & atmospheric propagation software for radiometrically-correct EO, IR and RF sensors and Out-the-Window (OTW) visual simulations: 0.2-25.0um EO/IR & 3kHz-3GHz radar



### EO, IR, RF Real-time Atmospheric Propagation

SigSim allows you to create or import weather profiles and compute arbitrary point-to-point transmission and path radiances, including multiple-scattering contributions. Altitude-dependent atmospheric parameters (optical depth, path radiance/ volume and scattering coefficients) are spectrally computed on-the-fly across the EO/IR/RF domains using a unique JRM-developed Modtran/Radtran library. Extremely-fast radiative transport algorithm and multiple-scattering routine spectrally compute per-LOS atmospheric, diffuse illumination integrals, and corresponding LUTs for on-the-fly rendering.



### Obscurant and Combustion Effects Modeling

SigSim also supports physics-based special effects like smokes, fires, flares, plumes and 3D clouds. Given the obscurant type and density, and (if applicable) fuel type or chemistry, heat of combustion, burn rate, and combustion area, SigSim will utilize its database of known spectral properties to compute spectral transmission loss as well as scattered and thermally emitted radiance for given path lengths through the medium.

### EO, IR, RF Real-time Signature Synthesis

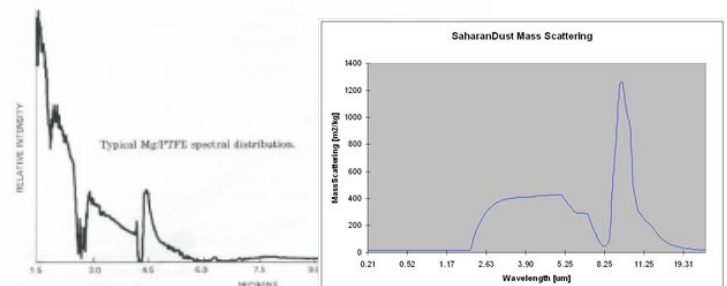
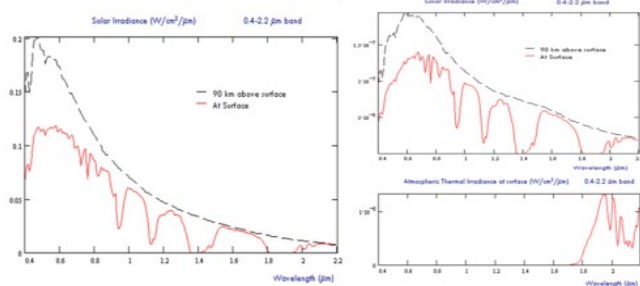
SigSim turns your existing visible simulation into a radiometrically-credible real-time spectral sensor simulation for arbitrary EO/IR/RF-band sensors like NVGs, FLIRs and radars. SigSim is also invaluable as a stand-alone analysis tool for single-LOS signature studies.

SigSim's real-time CPU and GPU algorithms work in tandem to synthesize on-the-fly real-time quantities for dynamic surface irradiance/thermal loading and temperature prediction, BRDF-based directional radiances (reflectance and thermal emission), and RF power returns. SigSim supports various fidelity/performance trade-offs, from pass-band-integrated to fully spectral rendering modes.

### Natural & Man-made Source Modeling

SigSim provides fast, dynamic spectral modeling of natural and man-made sources. It provides all the quantities necessary for realistic lighting, reflectance and thermal loading, including solar/lunar/stellar direct/diffuse spectral irradiances, downwelling sky, upwelling earthshine, and cloud spectral irradiances, and light-source spectral radiances for tungsten, sodium, mercury, neon, and polymetallic lamps. Custom spectra may also be imported. SigSim Spectral Irradiance Output

Example : 0.4-2.2 micron passband



\*Product contains no defense articles, classified, or export controlled (ITAR) data.

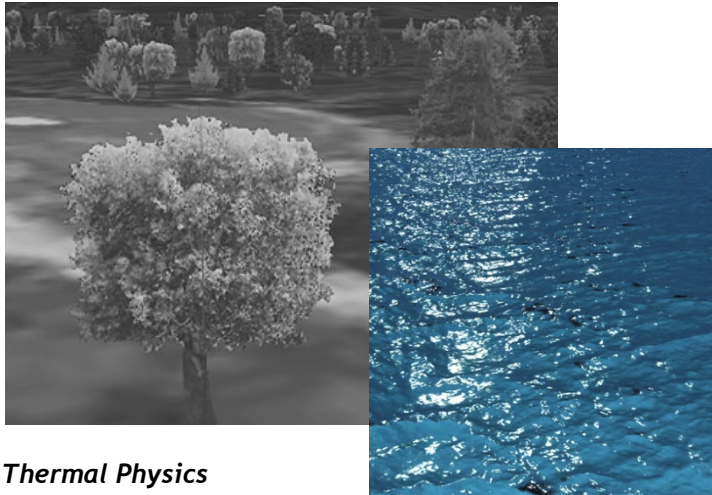
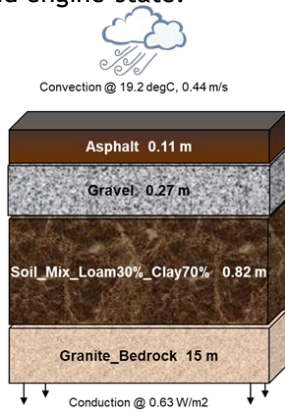
**SigSim provides real-time OpenGL, DirectX and Open Scene Graph (OSG) translation APIs for light source, signature & atmospheric in support of EO, IR, radar, and sonar.**

**Common, Material Property-Encoded Synthetic Environment for Complete Spectrum Modeling**

SigSim employs an innovative, multi-layered Material Systems Concept for the assignment of material configurations to texels, vertices, or facets, which specifies measured physical properties such as density, thermal conductivity, specific heat, BRDF, & RCS, along with radiative and convective thermal boundary condition parameters such as wind speed and engine-state.

**Optical-Band Physics**

SigSim supports energy-conserving versions of Phong, Sandford-Robertson, and Beckmann BRDF reflection models, driven by measured spectral data.

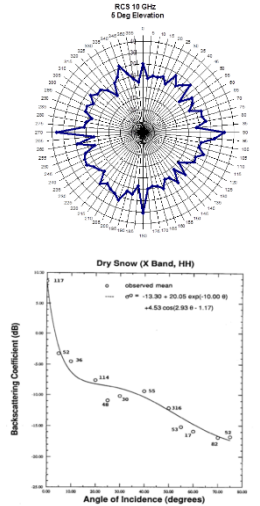


**Thermal Physics**

SigSim utilizes fast, fully-transient thermal models and unique angle-dependent parameterizations so that rendered signatures can respond on-the-fly to changes in boundary conditions, surface orientation, vehicle state & speed, wind-speed, air temperature, rain-rate, time-of-day, time of year, climate, etc. SigSim correctly models effects like diurnal cycle “cross-over”, thermal inertia, angle-dependent loading, radiative heating & cooling, and convective / precipitation cooling.

**Radar Physics**

SigSim supports the loading of frequency and angle-dependent Ulaby-Dobson terrain material RCS data, as well as common-format RCS data for 3D entities. SigSim’s embedded RADTRAN library supplies atmospheric transmission and RF noise data. These data are packaged by SigSim into tables for easy API-based interfacing with radar image prediction IG modules like OSV-Radar.



**Sonar Physics**

SigSim computes time-based SPL levels and acquisition probabilities for underwater acoustics constructive simulations, based on a library of common speed and angle-dependent marine entity data, bathymetry, and acoustic transducer specifications.

**Common Graphics / GPU API Support**

SigSim integrates with the latest nVidia GPU shader support for fidelity and performance. It also provides easy-to-use graphics APIs and sample apps to readily interface to OpenGL and DirectX IG applications and OpenSceneGraph rendering engines. JRM’s SigSim-enabled OSV/OSV-Radar sample applications come with interface source and binaries for Windows and Linux OS, out of the box with sample terrains and vehicle models.

**Physics Features & Rendering Advantages**

- On-the-fly MODTRAN/RADTRAN EO/IR/RF atmospheric
- On-the-fly dynamic environmental spectral irradiances
- Spectral reflectance/BRDF/Glint support
- Continuous time-of-day, dynamic weather
- Physics-based special effects (fires, smokes, flares, plumes)
- Physics-based spectral man-made and natural light sources
- On-the-fly transient thermal solvers
- Dynamic heating/cooling of vehicles
- nVidia graphics 32 & 64-bit high dynamic range support
- On-the-fly multiple-scattering and shadows
- Full correlation between OTW / EO / IR / NVG / Radar
- Cross-platform support