

GXP® sensor model solutions



At the heart of photogrammetry, sensor models incorporate complex equations relating the positions of points within a region, such as a specific building in North America, to their positions on images acquired by sensors. In addition, these models enable the estimation of parameters specifying the position, attitude, and movement through time of the respective sensor.

Sensor models expedite rigorous error propagation, so that measurements on images result not only in positions, angles, and distances, but also in estimates of the accuracy of these derived quantities. These models are essential not only to image registration, but to all subsequent stages of the photogrammetric workflow, including terrain generation, feature extraction, and visualization.

Adhering to prevailing international standards, GXP® software is renowned for its wealth of sensor models, supporting numerous electro-optical, infrared, multispectral (MSI), hyperspectral (HSI) and synthetic aperture radar (SAR) and LiDAR sensors. Many GXP sensor models are rigorous (i.e., they mathematically model the physical characteristics of the sensor), providing a degree of accuracy far above standard models which generally fit the physical system but don't replicate its inner structure.

Multiple sensor models often operate simultaneously in GXP software, facilitating a powerful fusion of data to maximize the accuracy of information while enabling advanced exploitation of a rapidly growing population of image sources worldwide.

Photogrammetric sensor models developed by Geospatial eXploitation Products™ (GXP) provide a geometric representation of how light is reflected off of the object of interest, delivered through the air to a camera (sensor), and then converted into pixels for visualization.

This approach applies equally to active sensors, such as LiDAR and SAR, which transmit energy to the object to be measured and then receive the reflected signal.

GXP sensor models support accurate determination of key measurements and advanced geospatial workflows.

- » Ground coordinates
- » Distance measurements
- » Height measurements
- » Feature extraction
- » Triangulation
- » Terrain generation
- » Orthorectification
- » 3-D modeling
- » Error propagation

GXP supports the full life-cycle of sensor model development including the following:

Design & Development

Design, development, and testing of the sensor model, including development of synthetic image data when actual data is unavailable.

Verification

Rigorous testing using ground truth to determine accuracy. All test results are analyzed and addressed by an expert team of photogrammetrists and identified issues are addressed appropriately.

Validation Support

Comprehensive support during the entire validation process including document preparation, technical support throughout testing, and development of recommendations.

Sensor models utilized in SOCET GXP®

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|--|---|---|--|
| › ADS40/80/100 | › Earth-i DMC3 | › PeruSat-1 | › Sensor Independent Derived Data (SIDD) |
| › ALOS AVNIR-2/PRISM/
PALSAR/PALSAR-2 | › EROS-B | › PlanetScope | › Sentinel-1A/2A/2B |
| › Arc Standard Raster Product
(ASRP 1.2) | › FORMOSAT-2/5 | › Pleiades | › SkySat |
| › ASTER | › Four-Corner | › Predator | › Smart Image |
| › Cartosat | › Frame Advanced | › Quickbird | › SPOT (1-3, 5+) |
| › Chandrayaan-1 TMC | › Generic Point Cloud Model
(GPM) | › RADARSAT-1 Orbit Aligned | › TanDEM-X (complex and
detected) |
| › Common Coordinate System
(CCS) mosaic | › Generic 2D/3D polynomials | › RADARSAT-2 North Aligned
and Orbit Aligned (complex
and detected) | › TeLEOS-1 |
| › Community Sensor Model
(CSM) support for user-
developed sensor models | › GeoEye-1 | › Rational Polynomial
Coefficients (RPC) | › TerraSAR-X (complex and
detected) |
| › Compressed ARC Digitized
Raster Graphic (CADRG) | › IKONOS | › Replacement Sensor Model
(RSM) | › United States Geologic Survey
Digital Ortho Quad and
Quarter Quad (USGS DOQ) |
| › COSMO-SkyMed (complex
and detected) | › KOMPSAT-2/3/5 | › RISAT-1 | › USMSD |
| › Digital Point Positioning
Database (DPPDB) | › Landsat | › SENSRA | › VisionMap A3 |
| › Direct Linear Transformation | › Mensuration Services Package
(MSP) | › SENSRB | › WorldView-1/2/3/4 |
| | › NCDRD (National Imagery
Transmission Format
v2.1 Commercial Dataset
Requirements Document) | › Sensor Independent Complex
Data (SICD) | |
| | › Ortho | | |

This list is not indicative of the full range of data that can be opened and exploited in SOCET GXP, but is intended to show the sensor models that can be initialized.

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