

SOCET SET[®] Release Enhancements

Version 5.3

BAE Systems is pleased to announce the release of SOCET SET® v5.3. This new release provides additional sensor models and new features based on automatic tie-point measurement for multi-sensor triangulation. Productivity improvements have been made throughout the SOCET SET workflow, including enhancements to SOCET for ArcGIS®, Sketch, Feature Extraction, Mosaic and more. Automatic Terrain Extraction (ATE) has been improved with enhancements for bare-earth and reflected surface processing using back-matching and multi-pair matching. Outlined below is a list of improvements and new features included in SOCET SET v5.3.

◆ **New Feature** – This is a new feature in SOCET SET v5.3

● **Enhanced Feature** – Enhancements to existing functionality or enhancements included in a SOCET SET v5.2 patch

Core

- ◆ **Close Range Tracking** – A new tracking mode for mouse movements of the SOCET SET cursor on imagery has been added to allow for logical cursor tracking on non-vertical imagery such as close range or high oblique images.
- ◆ **USB Devices** – The Stealth 3D Z-Mouse from ABC Software Developers is supported, supplementing the existing support for the E-Mouse and I-Mouse (www.stealth3dmouse.com).
- **Project Coordinate Systems** – SOCET SET project coordinate systems now support both U.S. Survey Feet and International Feet. The NGS 2003 vertical datum has been added to the list of vertical reference systems, and three coordinate systems were added for Italy and the United Kingdom.
- **Data Paths** – Path names and file names can now have spaces in them, giving increased compatibility with other geospatial exploitation products.
- **Operating Systems** – Windows® Server 2003 and Solaris® 10 have been added to the list of operating systems supported and tested with SOCET SET.
- **License Manager** – Improvements to the licensing for ATE and Mosaicking allow distributed processing of these batch applications for increased productivity.
- **DXF Import/Export** – The import and export of DXF feature data has been improved to handle text data.

Frame Imagery

- **Applanix POSEO** – Import and triangulation is now included for Applanix POSEO IMU/GPS data in support of frame imagery including scanned film and digital sensors (www.applanix.com).
- **PATB Import** – Improvements to the PATB import of orientation data allow for image matching, with image IDs for numerical and non-numeric characters comprising the image names and associated image IDs.
- **Camera Calibration** – Enhancements to the radial lens distortion model include the seventh power term for the polynomial correction model along with linear values for decentering distortion parameters. There are also separate values for the principal point of symmetry (PPS) and principal point of autocollimation (PPA).
- **Intergraph ImageStation® Automatic Triangulation** – Support for import of Intergraph's ISAT georeferencing information is supported for import of frame imagery.
- **Interior Orientation Report** – The interior orientation report file includes the results from both automatic and manual interior orientation in one report.
- **Block Setup** – Significant improvements have been made to the block setup utility for frame images with unknown georeferencing approximations. The graphical utility within Multi-Sensor Triangulation allows the user to manipulate strips graphically to form blocks over existing control, which is also displayed graphically. Display of imagery within strips and across strips allows for easy QA, to confirm that the block has been initialized properly.

Advanced Sensor Models

- ◆ **OrbView-3** – Import of OrbView-3 BASIC Enhanced Panchromatic Imagery, including enhanced telemetry data, has been added along with a new rigorous sensor model for processing OrbView-3 imagery throughout the SOCET SET workflow (www.geoeye.com).
- ◆ **WorldView** – Import of WorldView imagery and metadata forming a new rigorous sensor model has been added for processing the imagery throughout the SOCET SET workflow (www.digitalglobe.com). [Note: at the time of the SOCET SET v5.3 release, the WorldView sensor has not yet been launched.]
- **IRS-1C/1D** – Improved IRS-1C/1D import for LISS III and panchromatic imagery allows for rigorous sensor modeling throughout the SOCET SET workflow (www.nrsa.gov.in).

DataThruWay®

- **Sensor Model Factory** – The Sensor Model Factory for JTW v9.2.2 has been integrated to include support of U.S. Government sensors.

Multi-Sensor Triangulation, Automatic Point Measurement and Interactive Point Measurement

- ◆ **Ground Points** – New functionality to transfer unassigned image point measurements into tie-point records for a ground point file has been added, allowing for the ingest of image measurement data from other third party photogrammetry systems without an associated ground point list.
- ◆ **Automatic Tie Point** – The Adaptive Tie Point Matcher is a new option for APM employing a feature-based matcher to allow for tie-point measurement on disparate image types. The adaptive tie-point matcher uses area-based matching when imagery of the same type is input. The area-based matcher is similar to APM, but includes a local bundle adjustment to eliminate measurement errors prior to triangulation.
- **MST Setup** – Improvements for selecting strips and images for APM and Universal Triangulation (UTri) processing. UTri is the Universal Triangulation or simultaneous adjustment application within the Multi-Sensor Triangulation package. It performs the fully weighted least squares adjustment for multiple sensors combined into one universal adjustment.
- **Interactive Point Measurement** – Improvements have been made to allow imagery to be listed automatically and loaded optionally using

the auto-image list function when adding new tie points to a block of imagery.

- **Universal Sensor Model Support Data** – USMSD is an optional export for triangulated images from UTri. The export of USMSD supports product generation of DPPDB from government and commercial source imagery.
- **ADS40 Triangulation** – ADS40 Triangulation is being added to MST for processing Level 1 imagery. Level 1 is required to allow automatic tie-point measurement. The processing updates the .odf file for the associated imagery to allow for further exploitation of Level 1 imagery including ATE, Feature Extraction, VrOne®, etc., or Level 0 for orthorectification. [Note: at the time of the SOCET SET v5.3 release, the ADS40 Triangulation was not yet complete, so the functionality will be patched into v5.3 and available at www.baesystems/gxp.com.]

Sketch (supports SOCET SET Feature Extraction and SOCET for ArcGIS)

- ◆ **Area Based Digitizing** – Area Based Digitizing enables a user to suspend collection of one feature to collect another feature and then resume collection of the suspended feature. This productivity improvement allows operators to pick up features easily that are important and visible during the collection of other features with no interruption.
- ◆ **2–3 Point Rectangle** – Urban features aligned parallel to a linear feature can be collected easily with two points. The three point option does not require the rectangle to be parallel to a linear feature.
- ◆ **2D–3D Building Footprint** – The building footprint tool allows 2D polygons to be converted to 3D polygons using a digital surface model for Z placement.
- **Automated Feature Extraction** – The existing automated feature tools for edge delineation have been improved. The improvements are in the form of algorithmic processing and on-the-fly interaction with the operator.
- **Hemisphere Tool** – The hemisphere tool has been improved to allow for convex shapes. Spheres can be created by using the existing concave tool.
- **Parallel Line** – The parallel line tool has been extended to include polygons.
- **Trim/Extend** – The trim and extend tool has been enhanced to operate on-the-fly during extraction of linear features.

SOCET for ArcGIS

- ◆ **Grouped Layers** – Grouped layers from ArcMap® can now be viewed or edited in the SOCET SET viewport.
- ◆ **Snapping** – A new snapping agent has been added to ArcMap to support on-demand snapping. The ArcMap auto-cache option is set “on” by default to the viewable extent of the ArcMap canvas. In both cases, the manual or dynamic snapping performance is improved.
- **Hotkeys** – A total of 24 commonly used ArcGIS commands are mapped in SOCET SET to allow for assignment to hotkeys, including keys on 3D input devices such as the Stealth 3D Mouse.
- **Attributes** – Attribution for length, area, and subtype attributes are populated automatically for certain attribution codes.
- **2D/3D Collection** – 2D collection and edit is supported using terrain or surface models to support proper superimposition of features on the stereo imagery. The 2D and null-elevation 3D features can also be updated using the Z from a terrain or surface model. The area of update can be defined by an operator using a minimum bounding rectangle, or using the extent of the elevation data. The update is applied to those feature layers that are checked in the ArcMap table of contents.
- **Rubberbanding** – Dynamic graphics are supported for editing and creating linear and polygonal features.
- **Zoom to Extent** – Zoom to Extent from ArcMap allows the SOCET SET viewport to match the zoom and orientation of the images being displayed.

Feature Extraction

- **Save** – Improved error checking to validate saved data from Feature Extraction. This is important for saving data across a network on occasions when the network fails.
- **Feature Specification Editor** – The Feature Specification Editor can now be navigated easily and sorted alphabetically.
- **Automatic Attribution** – Several customer-specified automatic attribution elements were added for U.S. Government mapping.

Terrain

- ◆ **Merge** – A new merge tool has been added to SOCET SET for merging grid terrain data. The new merge allows for bias removal between adjacent terrain files.
- ◆ **ATE Back-matching** – Automatic Terrain Extraction now has an option for back-matching. The back-matching allows for the elimination of measurement blunders, especially along low contrast areas, such as roads or in forested areas, where textures may mismatch between forward and backward correlation.
- ◆ **ATE Multi-Pair Matching** – Automatic Terrain Extraction now has an option for multi-pair matching, which allows several correlation attempts for a single elevation point based on overlapping images and the number of matches allowed by the operator. Multi-pair matching allows for measurement of points in low contrast and occluded areas where one or more images may result in false correlations, while the remaining may acquire correct elevations.
- **IFSAR** – Direct import of IFSAR terrain data from Intermap Technologies provides high-resolution terrain and surface modeling for editing and/or product generation including orthomosaics (www.intermap.com).
- **High-Resolution Terrain Information** – HRTI import and export is supported.
- **Geographic Support** – Decimal degree units for latitude and longitude in geographic projects are supported for ESRI®’s ArcGrid®, ASCII, and GeoTIFF import and export.
- **Copy** – The performance for re-projecting terrain from one SOCET SET project to another has been improved by 100 times over SOCET SET v5.1.
- **TIN** – A new tiling scheme has been implemented for easy storage and retrieval of TIN terrain data allowing for manipulation of ultra large data sets.

- **Precision** – Terrain precision is computed and stored on a per point basis, allowing better error analysis for point mensuration as well as improved merging.

Mosaic and True Ortho

- ◆ **Parallel Processing** – The orthomosaic process allows for parallel processing when multiple processors are detected. The Mosaic application and new licensing allow for tiled processing of image chunks on multiple processors.
- ◆ **Void Fill** – Void pixel data within overlapping imaging areas is now filled with pixels from conjugate imagery where actual image pixels exist.
- ◆ **Variable Imagery** – Input imagery with different bit depths and numbers of bands can now be processed in Mosaic without having to resample the input imagery to one common format. The Mosaic processing resamples the input imagery to the lowest common format for bit depth and number of bands.
- **Centerline Seamline Option** – For satellite imagery acquired in off-nadir imaging acquisitions, the “most nadir” seamline option may result in seamlines that extend to the edge of one of the images. Therefore, the centerline seamline option was added to allow seamlines to be determined in the middle of the imaging footprint.
- **DOQ/DOQQ** – The DOQ/DOQQ corner coordinates are now even multiples of the output GSD.
- **Mosaic Sheets** – Processing sheets using an input textual sheet description file can now be broken up for processing by selecting individual or multiple sheets from the Mosaic Manager Output Tab.
- **True Orthophoto** – True Orthophoto can now process two-byte imagery, producing output imagery with the same bit depth as the input.

OpenFlight Export

- ◆ **Shapefiles** – OpenFlight Export now exports ESRI shapefiles with associated project files, allowing for coordinate system referencing for the shapefile.
- ◆ **Generic Features** – Generic point features such as trees, cars and light poles include attributes for rotation and scale.
- ◆ **Buildings** – Building footprints as well as center points are output in the SOCET SET project coordinate system in shapefile format.

ClearFlite®

- ◆ **ICAO PANS-OPS** – The internationally recognized aerodrome surfaces for obstruction identification have been added to ClearFlite.

DPPDB and CIB® Production

SOCET SET Digital Point Positioning Data Base Format Production Module (DPPDB) [which uses MIL-PRF-89034, March 1999 format specifications] and SOCET SET Controlled Image Base® (CIB) Format Production Module [which uses MIL-PRF-89041, 15 May 1999 format specifications] are currently under U.S. Department of State evaluation for export jurisdiction and are temporarily unavailable for customers outside the United States.

- ◆ **Commercial Source** – Expanded DPPDB and CIB production capabilities now support a full array of commercial sensors. The new products are formatted and packaged in the same manner as the official DPPDB and CIB products in use today.
- ◆ **Universal Sensor Model Support Data (USMSD)** – A single support file that uses an RPC mathematical model to store triangulation results for all of the images included in a SOCET SET triangulation. This file is required input to the new commercial DPPDB and CIB production flows.
- **DPPDB Boundary Adjustments** – Individual boundary adjustments for north, south, east, and west directions of the bounding rectangle can now be made.
- **DPPDB Segment Generation** – New pixel line display has been added for each individual segment created.
- **CIB Image Import** – Imagery can now be sized automatically to fit the CIB cell when imported into SOCET SET.
- **CIB Mosaic Manager** – CIB production now uses SOCET SET’s Mosaic Manager as part of the production process. Individual images can be selected and overlaid on top of the CIB cell for ease in selecting the appropriate coverage for the CIB product.
- **CIB Viewer** – An improved CIB Viewer has been added to simplify the quality assurance process. Hot keys have been replaced with a new control panel and performance has greatly improved over the previous version.

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