

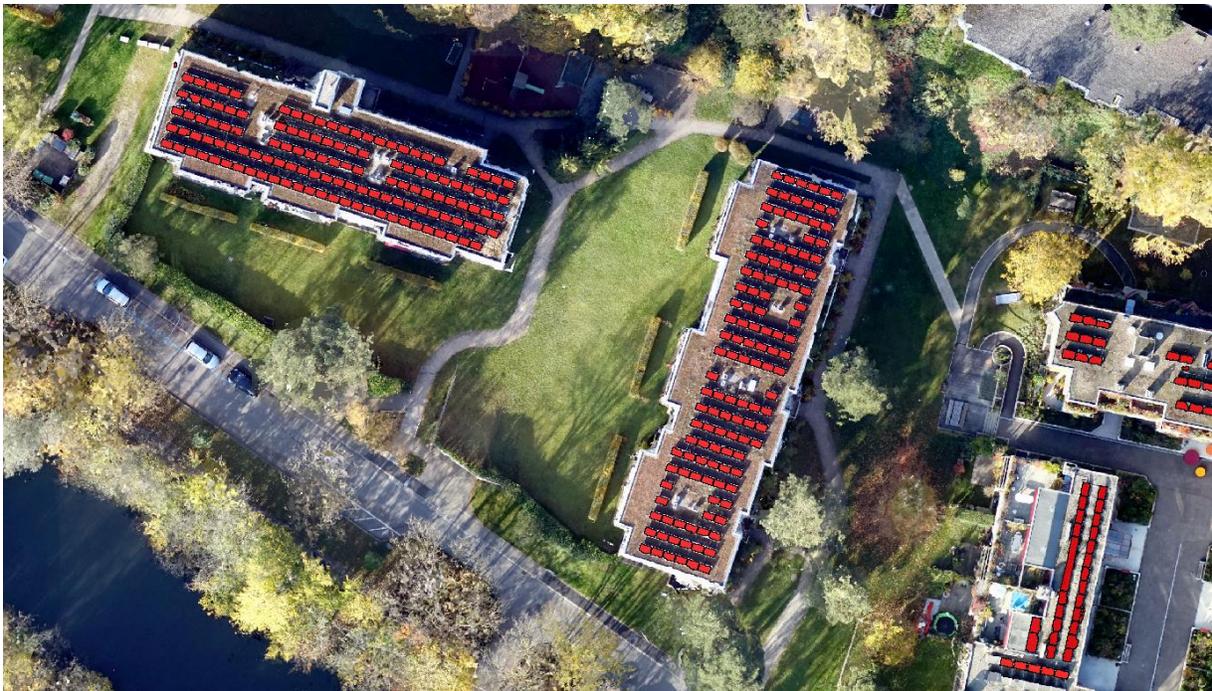
## Geomatica Banff

As a Canadian company founded in 1982, we are proud of our heritage and of the people who work to develop leading edge integrated desktop and enterprise software that features tools for remote sensing, digital photogrammetry, geospatial analysis, map production, mosaicking and more. We believe in doing well, and doing good with remote sensing technology – as such, we have chosen to highlight the beauty of Canadian parks in our branding starting with this release, which we have codenamed Geomatica Banff. More than ever, the role that remote sensing can play to protect our sensitive ecosystems, is of critical importance.

### *Highlights*

---

New: Object Analyst workflow, Batch Processing (Focus, Python)



Wingtra UAV image (2 cm GSD) - automated extraction of roof solar panels (red)

## **Batch processing and automation**

Geomatica Banff introduces automation for object-based image analysis. Automation is available in Focus from the Object Analyst panel or can be implemented as a chained workflow with individual algorithms (and Python).

Training data can be created from multiple locations and deployed to classify and extract features of temporally overlapping imagery or data sets covering various geographic areas.

Now you can train your data sets once and classify consistently over and over again.

## **Easy to learn and use**

Object-based classification provides powerful, easy-to-use tools to extract features from optical and synthetic-aperture radar (SAR) imagery. The unique design of the intuitive workflows decouple raster and vector operations and provide excellent opportunities to perform data fusion at the object level.

## **Process large images**

Segmentation algorithms have been optimized for performance, and are no longer constrained by the size of the input imagery. Performance will still be driven by parameters, such as the size of input files and the number of channels. If required, segmentation can be easily completed on subsets or tiles.

## **More predefined attribute calculation**

Additional geometrical, texture, and vegetation-index attributes have been added to streamline the processing of imagery. By leveraging the rich metadata that is created when reading imagery, you can automatically determine the possible attributes that can be calculated with the algorithm.

## **New Object Analyst features**

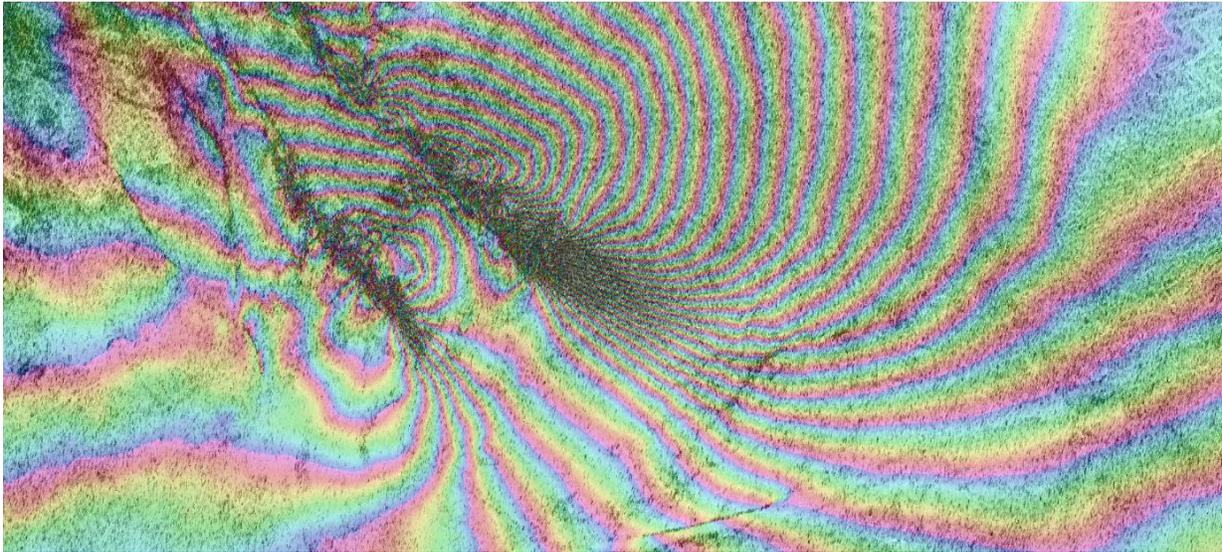
In the Object Analyst window, you can create a template for segmentation, polygon attribution, and classification, and automate the processing for other data sets. The same process can be carried out using a series of Python-enabled workflows, which have been developed to deal specifically with optical and SAR imagery.

By training the data, a hyperplane model is created that provides the appropriate parameters for all polygons based on the classification results of the training sample. The hyperplane model can then be applied through automation for any other data set that has the same number of bands and similar resolution as the template.

## Highlights

---

### New: Sentinel-1 TOPS InSAR processing



Sentinel-1 InSAR image processing over Ridgecrest earthquake (M 6.4 and M 7.1), California (20190704 – 20190716)

### Use Sentinel-1 TOPS SAR data like any other data set

Sentinel-1 imagery can be ingested like any other data set using PCI GDB technology. Deburst data (SLC format) is reconstructed into a single contiguous file from the interferometric wide or extra-wide imagery. You can work on the entire image or ingest a subset based on an area of interest (AOI).

### Precise positioning through custom creation of RPCs

PCI has developed technology to make full use of the Sentinel-1 state vectors, which provide positional information on across-track and along-track data. The technology uses state vectors to create highly accurate (1 pixel or less) rational polynomial coefficients (RPC), which can be used to precisely position the images.

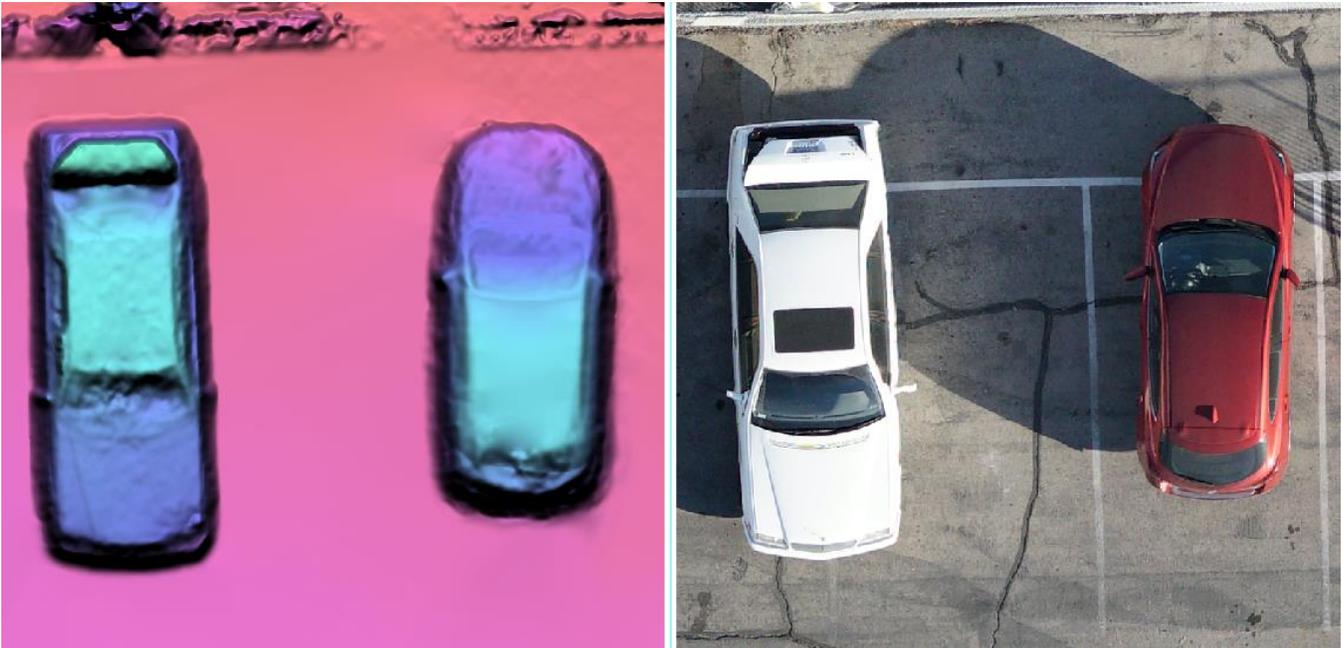
### InSAR processing workflows

Sentinel-1 TOPS imagery can be used for operational InSAR processing and leverage the rich set of algorithms that are accessible through the Geomatica platform Python API. After ingesting the data, you can use existing technology to complete the workflow. All relevant metadata is captured and passed along by the various InSAR algorithms.

## Highlights

### New: UAV image processing

New point matching, one-to-one DSM generation, and powerful editing tools to generate high-quality UAV products.



Wingtra UAV image (2 cms GSD) – 1:1 DSM (left) and DSM True Ortho product (right)

### Automated ingestion, orientation, and dense multi-ray point collection

UAV support leverages the aerial workflow and can be processed using existing and new aerial-processing technology. The technology includes automatic reading of EXIF tag information commonly collected during UAV surveys to provide initial orientation, altitude, and image position. New feature-based matching (FBM) technology, combined with other powerful multi-ray tie-point-collection algorithms generate strong networks of well-distributed points. Higher-quality results can be obtained by providing externally derived camera-calibration parameters.

### One-to-one DSM generation and true orthorectification

The DSM ortho workflow guides you through generating true-orthorectified products with minimal interaction. Generating DSM Ortho products is completely automated by using digital surface models (DSM) that eliminate the time-consuming requirement of manually digitizing buildings.



## **Live editing, Smart GeoFill, and touch ups**

With Geomatica Banff, you can process UAV data to create high-quality products, including the ability to edit the digital elevation model (DEM) in real time, and use Smart GeoFill to fix problem areas common in ortho mosaics. Powerful editing tools help you to streamline processing and deliver high-quality products.

## **Automated image-to-image coregistration**

From a reference data set, or from an initial ortho-mosaic corrected by using ground control, you can automatically coregister additional collections very accurately by using image-to-image coregistration.

## **Powerful image analysis and information extraction**

You can use more than 550 Geomatica algorithms to perform image analysis and extract information. With UAV analysis, you can select from vegetation-index creation, change detection, and object-based image analysis for classification, feature extraction, or both.

## Highlights

### Efficient and greatly improved aero-triangulation tools

#### Point collection and block bundle adjustment

With the implementation of feature-based matching (FBM), Geomatica Banff provides more flexibility to work with challenging data sets. FBM can collect a dense set of tie points and automatically orient images when omega, phi, and kappa values are not well known. The FBM algorithm is available in Geomatica OrthoEngine and automated Python workflows. FBM is also easy to integrate with point-refinement and block bundle-adjustment algorithms.

#### Visualization of image blocks and quality assessment

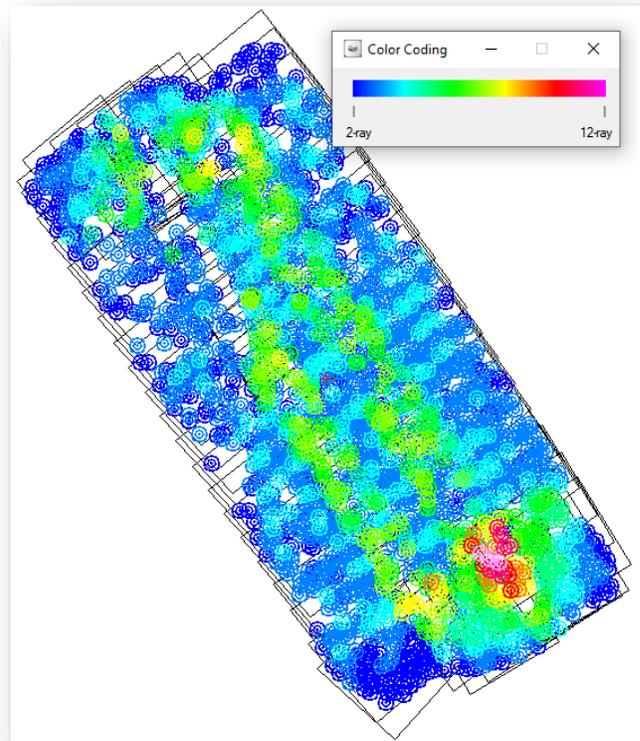
In OrthoEngine, the Project Overview window has been enhanced with the ability to visualize the connectivity of ground control points (GCP) and tie points (TP).

#### New, iterative point-refinement algorithm

Geomatica Banff includes a new algorithm known as Point Refine (PNTREFN), which automates the improvement of the block bundle adjustment through iterative deactivation of points until a solution and acceptable error level is achieved. The new algorithm is better at locating potential blunders, removing them from the block, and iterating through until an ideal solution is calculated.

#### Custom settings for GCP and TP accuracy

New settings have been added to specify accuracies of GCPs and TPs for all images or a selected subset. The new capability gives you the option to spatially vary the accuracy of an image block while keeping all images together in a single block and controlling spatially varying output accuracy when required.



**New color-coded connectivity (tie points)  
display for aerial project**

## More Highlights

---

### RADARSAT Constellation Mission (RCM)

#### Support for simulated data and RCM samples

Geomatica Banff now provides a rich set of algorithms you can use to read RCM data samples initially provided by the Canadian Space Agency (CSA). With these samples, you can perform compact polarimetry analyses, object-based SAR-image analysis, and more.

### Analysis Ready Data Tools

Add-on package for image preprocessing for multi-temporal analysis.

#### Rigorous scientific preprocessing

Geomatica Banff provides improved tools to produce geometrically and radiometrically corrected data at scale. The package provides you with the ability to generate standardized illumination conditions and surface-reflectance products to perform meaningful multi-temporal analysis with new big-data architectures, such as the Open Data Cube.

#### Intuitive calibration of atmospheric models

Use the available graphical and statistical tools to guide you through calibrating and validating your atmospheric models. Geomatica Banff includes improved easy-to-use tools for comparing target and reference spectra from various sources.

### Bingo Integration

Bingo, an authoritative aero-triangulation package, provides maximum flexibility to process aerial data sets and can be used increasingly in combination with Geomatica to provide an end-to-end workflow for aerial-surveying projects.

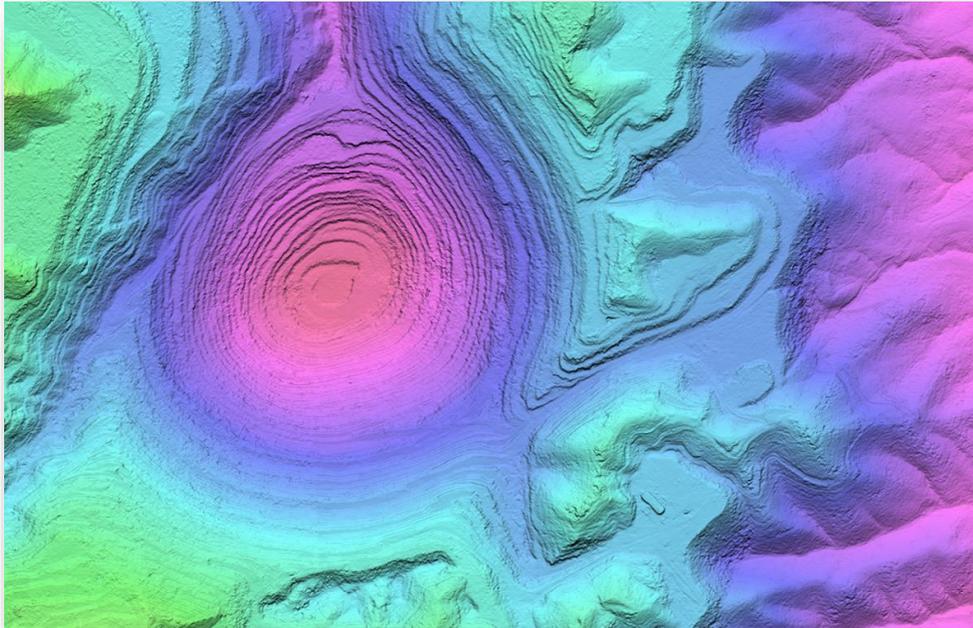
To support the implementation of a more streamlined workflow between OrthoEngine and Bingo, the following improvements have been made:

- Enhanced OrthoEngine support for importing and exporting Bingo projects, including
  - Override model recalculation (block bundle adjustments) when you import Bingo results
  - Integrate Bingo-generated distortion grid

## Geomatica Focus

### Shaded-relief map layers

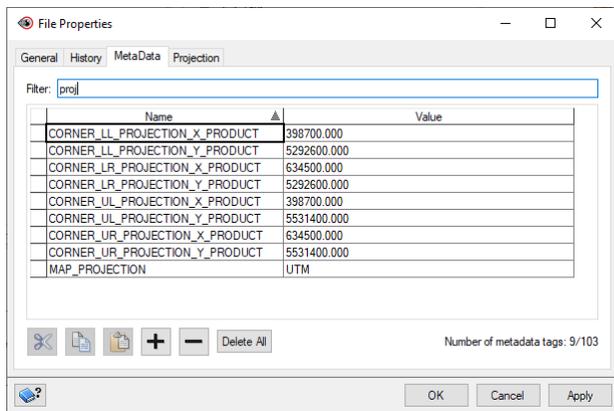
Visualization by using shaded relief is now available as a standard layer type.



Shaded-relief view of DEM extracted from stereo overlapping imagery, Bingham Copper Mine, Utah

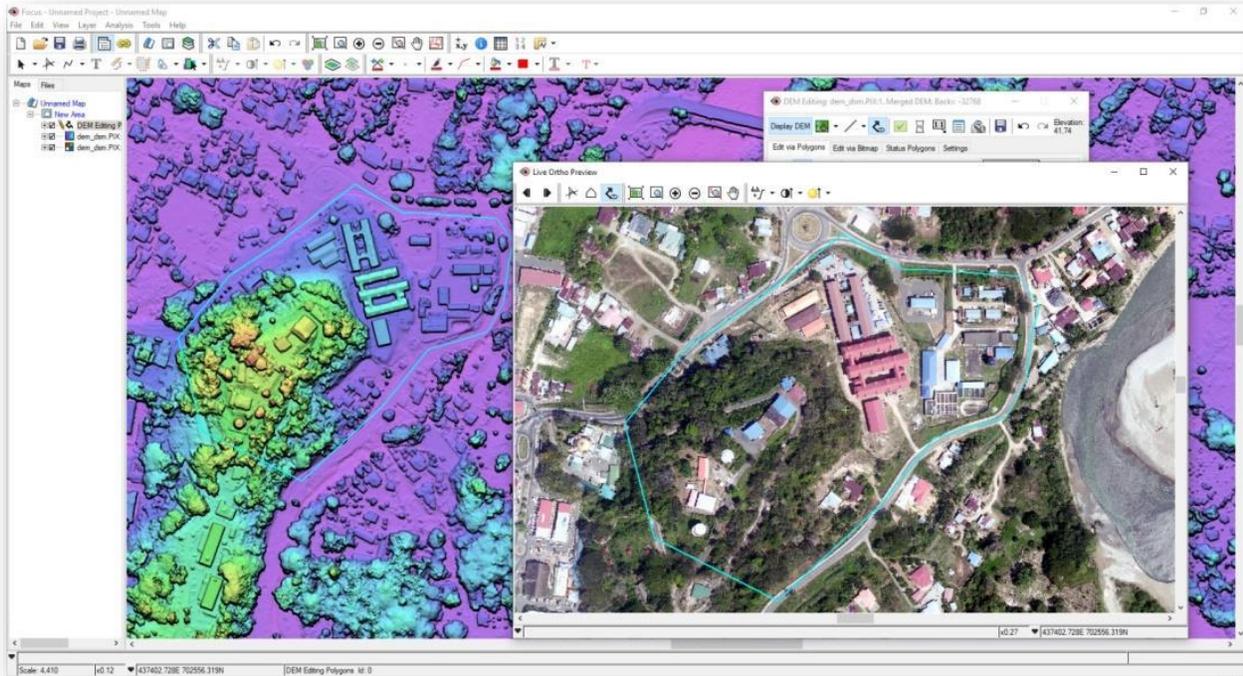
### Metadata

Upgraded Metadata tab on many properties dialog boxes, such as the File Properties dialog box, shown, make it easier to find tags and their associated values. You can reorder, sort, and search the available table.



## DEM Editing – Live Ortho Preview

The Live Ortho Preview window displays a full-resolution preview of images orthorectified using the active digital elevation model (DEM), and you can view changes in finer detail. When you apply changes to the DEM, the ortho images are regenerated automatically. The preview displays an accurate depiction of how the changes affect images orthorectified using the updated DEM. In the following figure, the active DEM is displayed as shaded relief, and the DEM Editing toolbar and an associated ortho image are also shown.



Live DEM and Live Ortho Preview tools in Geomatica Focus

## File management

On the **Files** tab, you can apply commands to a selection of files, increasing your productivity.

## Native language character support

Focus tools, like the vector Attribute Manager, now support editing of non-English characters. Note that the change also will affect other parts of the application, such as an item's description, and anywhere that has a table, like the **Metadata** tab of many properties dialog boxes.

## New and updated sensor support

Updates to supported sensors are as follows.

### New GDB-supported sensors

- Kanopus-V: Earth observation minisatellite mission of the Russian Space Agency, Roskosmos and ROSHYDROMET/Planeta.
- Gaofen 6 (GF6): Geostationary, Earth-observation satellite in the Gaofen series of Chinese civilian remote-sensing satellites. The satellite is similar to the Gaofen-1 satellite launched in 2013, but with upgraded capabilities, including a 2-meter resolution panchromatic camera, an 8-meter multispectral imager, and a 16-meter multispectral wide-angle colour camera.
- PAZ: X-band SAR spacecraft based on the TerraSAR-X platform to serve security and defense. The PAZ mission is dual-use (civil/defense) funded and owned by the Ministry of Defense and managed by Hisdesat (Hisdesat Servicios Estratégicos, S.A., a Spanish private communications company).
- Radarsat Constellation Mission (RCM): Constellation of three C-band synthetic-aperture radar (SAR) satellites. These satellites support a wide variety of imaging modes. The modes range from wide-area surveillance with 500-kilometer imaging swaths to spotlight modes with resolution of 1 meter in azimuth and 3 meters in range.
- Gaofen 3 (GF3): The first C- band high-resolution SAR satellite, capable of providing Earth images up to 1-meter resolution (with 10-kilometer ground swath). The GF3 SAR package can operate in 12 different working modes, from high-resolution (1 m) to large-swath (650 km), and from maritime imaging to combined land and water imaging.

### Updated GDB-supported sensors

- RADARSAT-2
  - Single NITF file format
- Sentinel-1
  - Support for Terrain Observing Progressive Scan (TOPS) mode
- SPOT 1-4
  - CAP format support

## Support for Python 3.5

Geomatica Banff supports Python 3.5. During installation, you will be given the option of selecting Python 2.7 if you already have this version installed on your machine. Otherwise Python 3.5 will be installed. Many of the existing Python 2.7 scripts can be easily transformed to work within the new Python 3.5 environment, and PCI's Support team can assist you.

## *New and enhanced algorithms*

---

The following algorithms have been added or updated in Geomatica Banff:

### **New: Automated object-based image-analysis**

- OASEG: Automatically segment an optical image based on the scale, shape, and compactness parameters you specify.
- OASEGSAR: Automatically segment a SAR image based on the scale, shape, and compactness parameters you specify; can also perform filtering and tail trimming.
- OACALCATT: Automatically calculate attributes, including presets for vegetation indices, texture, geometrical, and more (suitable for optical imagery).
- OACALCATT SAR: Automatically calculate attributes, including presets for polarimetric decompositions, texture, geometrical, and more (suitable for SAR imagery).
- OAFLDNMEXP: Automatically export training-class information, which can be used by training and classification algorithms.
- OASVMTRAIN: Create an output Support Vector Machine hyperplane file (training model) from a set of training sites and object attributes).
- OASVMCLASS: Classify objects by using the Support Vector Machine algorithm with the specified model.

### **Photogrammetric Improvements**

- FBMEEXTRACT: Extract features and descriptors from images for feature-based matching. The extracted features are written to a feature database (FDB) file for use as input with the FBMTIE algorithm.
- FBMTIE: Perform feature-based matching to collect tie points (TP). The features are read from feature database (FDB) files created by the FBMEEXTRACT algorithm.
- FBMIMPORT: Create a Geomatica OrthoEngine project file from the text file of collected TPs created by running FBMTIE.
- GENAPEO: Calculate the exterior orientation (EO) of each photo in an OrthoEngine project file based on the x, y, and z position of the first and last photo of each flight line.
- PNTREFN: Refine TPs and ground control points (GCP) in an OrthoEngine project file.



## General Algorithms

- DILATEBIT: Perform morphological operations (dilation and erosion) on a bitmap layer and, optionally, fill unmasked areas, remove masked areas, or both.
- MANAGEDATASET: Manage data sets: copy, delete, rename, move, or list files of the set.
- SPECLINCMB: Perform a spectral linear combination of image channels using coefficients you specify.