

## *Pan Sharpening*

---

The PANSHARP algorithm applies an automatic image fusion that increases the resolution of multispectral (color) image data by using a high-resolution panchromatic (black and white) image. Most Earth resource satellites, such as SPOT, IRS, Landsat, IKONOS, and Quickbird, provide multispectral images at a lower spatial resolution and panchromatic images at a higher spatial resolution. This allows you to easily fuse images acquired simultaneously by the same sensor. Alternatively, you can fuse images from different sensors.

PANSHARP works with 8-bit, 16-bit, and 32-bit real data types.

### Module Prerequisites

Pan Sharpening is an add-on to Geomatica. It requires Geomatica Core or Geomatica Prime as a prerequisite.

### PANSHARP Algorithm

The PANSHARP algorithm is based on the least number of squares to an approximate gray-value relationship between the original multispectral image, panchromatic image, and fused image. Using the PANSHARP algorithm, you can:

- Solve color-distortion and operator- or data-dependency problems
- Achieve the best color representation
- Preserve the mean, standard deviation, and histogram shape for each channel
- Fuse all spectral bands of a satellite image with the corresponding panchromatic band at once
- Minimize color distortion, maximize feature detail, and naturally integrate color and spatial features

### PANSHARP Input Images

The PANSHARP algorithm requires the following input images:

- Multispectral Image Layers:
  - Color layers that will be fused with a high-resolution panchromatic image layer
- Reference Multispectral Image Layers:
  - Aid in the pan-sharpening process
  - Span the same frequency range as the panchromatic image layer
  - Vary from sensor to sensor
- Panchromatic Image Layer:
  - The high-resolution grayscale layer used to pan-sharpen the multispectral image layers



## PANSHARP OPTIONS

The PANSHARP algorithm offers:

- Enhanced pan sharpening can generate a refined pan-sharpened output image:
  - “Yes” option generates a refined pan-sharpened output image (more suitable for visualization or visual interpretation purposes)
  - “No” option generates a standard pan-sharpened output image (more suitable for digital classification purposes)
- No-data image value:
  - Specifies a background value for all layers
- Pyramid options:
  - Specifies the type of resampling to use when computing overview levels (nearest neighbor, average, or mode)

## For Best Results

When using the PANSHARP algorithm, it is recommended that you:

- Use multispectral-image channels whose wavelengths lie within the frequency range of the panchromatic image channels
- Do not exceed a resolution ratio of 5:1 (e.g. 5m color, 1m grayscale)
- When working with satellite data, use the GRNEHN algorithm as a post-processing step after running the PANSHARP algorithm

For improved performance when Pan sharpening, use the OpenMP enabled version of PANSHARP

- PANSHARP2

*The Pan Sharpening technique was originally developed by Professor Yun Zhang, from the University of New Brunswick.*

### For more information, contact

PCI Geomatics  
90 Allstate Parkway, Suite 501  
Markham, ON L3R 6H3  
Canada

**Phone:** 1 905 764 0614

**Fax:** 1 905 764 9604

**Email:** [info@pcigeomatics.com](mailto:info@pcigeomatics.com)

**Web:** [www.pcigeomatics.com](http://www.pcigeomatics.com)