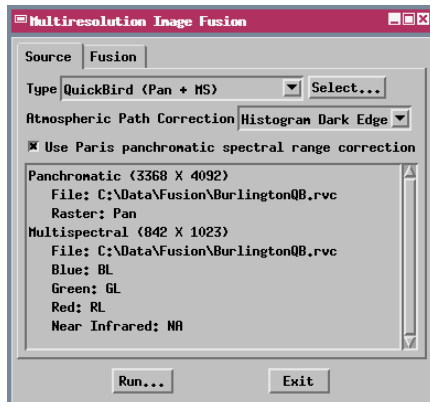


## Multiresolution Fusion

# Pan-Sharpening Procedures

The TNTmips Multiresolution Image Fusion process (Raster / Combine / Multiresolution Fusion) provides flexible resolution-enhancement of a multispectral image using a higher-resolution panchromatic image band, a procedure commonly known as pan-sharpening. This process can be used to pan-sharpen images or image extracts from a variety of satellite sensors, including QuickBird, IKONOS, OrbView3, SPOT, Landsat 7, and IRS LISSIII. The spatial extents of the panchromatic band and the multispectral band set do not have to match exactly, nor are there constraints



on their ratio of cell sizes, so you can mix panchromatic and multispectral data from different image sources if desired. The low-resolution panchromatic band is automatically reprojected to match the extents (if necessary) and cell size of the high-resolution bands.

You can choose from several image source types on the Source tabbed panel and choose fusion products (composite or RGB separates) and color fusion methods on

the Fusion tabbed panel. The available combinations of these options are summarized in the table at the bottom of this page. Additional processing options are available for certain source types.

Specially-tailored processing is available for QuickBird and IKONOS images, as detailed in the Technical Guide entitled *Multiresolution Fusion: Calibrated Pan-Sharpening*. For these images you can use the panchromatic band plus all four multispectral bands to create calibrated, color-balanced natural color or color-infrared composites or color separates that combine optimal color with high spatial detail. For images from other sensors you can use the panchromatic band and any three multispectral bands or a **color composite** derived from these multispectral bands to create a pan-sharpened composite-color image or color separates. The spectral range of panchromatic bands varies from sensor to sensor; therefore for best natural color or color-infrared results you should choose multispectral bands that match the range of that sensor's panchromatic band. Finally, you can use the Unspecified option on the Type menu to process the panchromatic band and three or more multispectral bands to produce a pan-sharpened set of grayscale bands.

Several color fusion methods are available in the Multiresolution Fusion process. Results from the Paris and Brovey methods are compared in the TechGuide entitled *Multiresolution Fusion: Comparison of Pan-Sharpening Methods*.



Color-infrared combination of image bands from a small portion of a QuickBird scene of an area in Vermont. Above, display of original bands (2.4-meter cell size). Below, same band set after pan-sharpening to 0.6-meter cell size reveals significantly more spatial detail.



Summary of Multiresolution Fusion Inputs, Products, and Methods

Source Type	Inputs	Available Fusion Products	Available Color Fusion Methods
QuickBird (Pan + MS)	Panchromatic + 4 multispectral bands in specified order	Natural Color or Color-Infrared: Composite color 8-bit separates 16-bit separates	Brovey Paris
IKONOS (Pan + MS)			
Pan + RGB Separated	Panchromatic + 3 multispectral bands as R, G, and B	Composite Color 8-bit RGB separates 16-bit RGB separates	
Pan + RGB Composite	Panchromatic + composite-color raster		
Unspecified	Panchromatic + 3 or more multispectral bands	Match source: 1 sharpened grayscale product for each input MS band	Brovey