

Multiresolution Fusion

Comparison of Pan-Sharpening Methods

Multiresolution fusion of satellite images to produce natural-color or color-infrared products entails not only spatial enhancement using a panchromatic band but also recombination and optional enhancement of the color information provided by the selected multispectral image bands. Several methods of handling the color fusion task are available from the Method menu on the Fusion tabbed panel in the Multiresolution Image Fusion window. These methods enable you to produce pan-sharpened products with appropriate brightness, contrast, and color balance, which is especially important when you opt to produce a color composite as the sharpened product for direct visual interpretation, printing, or publication.

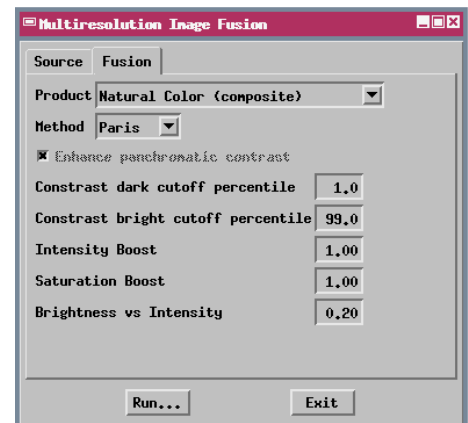
The Paris color fusion method is an optimized color-space transformation with integrated contrast enhancement of the selected panchromatic band. Contrast adjustment and other related controls on the Fusion panel are automatically activated when you choose this method.



Natural-color RGB display of 4-m resolution multispectral bands from a portion of an IKONOS image bundle. Natural-color Multiresolution Fusion results for this area using two color fusion methods are shown below.



Calibrated pan-sharpened color composites (natural color) produced in the Multiresolution Fusion process from an IKONOS sample image bundle. Image on the left was created using the Broyevy color fusion method with contrast enhancement of the IKONOS panchromatic band and modest intensity boost. The right image used the Paris color fusion method with enhanced panchromatic contrast and intensity boost with the addition of modest saturation boost to create more saturated colors without changing the overall color balance of the image.



You can control the contrast enhancement by varying the dark

and bright cutoff percentile values and adjust the overall brightness of the result by varying the Intensity Boost parameter. The Saturation Boost setting lets you adjust the saturation of the colors produced without altering the overall color balance. In addition, you can adjust the relative contributions of brightness and intensity to the color-space transformation.

The well-known Brovey fusion method computes the ratio between a panchromatic cell value and the average of the corresponding multispectral cell values and uses that ratio to compute the color component values for the pan-sharpened product. The panchromatic contrast enhancement and intensity boost options are also available with this method, but not the saturation boost option provided with the Paris method.

The Paris color fusion method in the Multiresolution Fusion process was developed for MicroImages by Dr. Jack F. Paris, a remote-sensing researcher and long-time client with 40 years of image-processing experience.