## Multiresolution Fusion

Calibrated Pan-Sharpening

The QuickBird and IKONOS satellite sensors each provide blue, green, red, and near-infrared multispectral bands and a higher-resolution panchromatic band that spans the spectral range from blue to near-infrared. The TNTmips Multiresolution Fusion process provides specially-tailored pan-sharpening calibration options for these QuickBird and IKONOS multispectral/panchromatic image bundles. These proprietary calibration options enable you to produce pan-sharpened natural-color or color-infrared composites or RGB raster sets with proper color balance and relative spectral calibration, results that cannot be achieved using generic pan-sharpening methods.

To apply this calibration, choose QuickBird (Pan + MS) or IKONOS (Pan + MS) from the Type menu on the Source tabbed panel. You are then prompted to choose the panchromatic band and all four multispectral bands. Two additional controls on the Source panel are activated only for these sensor types. Choose Histogram Dark Edge from the Atmospheric Path Correction menu and turn on the toggle button labeled "Use Paris panchromatic spectral range correction" to set up the special spectral calibration and balancing. You can then choose from any of the color fusion methods (Method menu on the Fusion tabbed panel), but the Paris method provides you with the most flexibility to enhance the contrast and color of the final pan-sharpened image (see the color plate entitled *Multiresolution Fusion: Comparison of Color Fusion Methods*). Using these calibration procedures for Multiresolution Fusion produces pan-sharpened QuickBird and IKONOS images with optimal, balanced color as well as high spatial detail.

> The algorithms used for QuickBird and IKONOS calibration in the Multiresolution Fusion process were developed for MicroImages by Dr. Jack F. Paris, a remote-sensing researcher and long-time client with 40 years of experience in image processing.
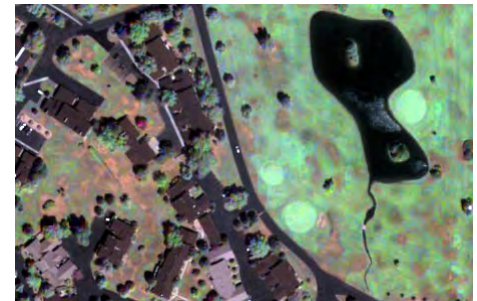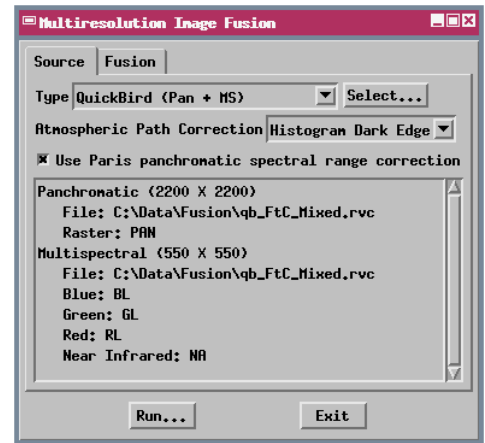
Portion of the QuickBird scene shown below with only generic natural color pan-sharpening applied, without sensor-specific calibration. Colors are distorted: areas of green vegetation are far too bright and water is far too dark.

QuickBird Multispectral Bands (2.8-m cell size)

RGB display of red, green, and blue spectral bands from a Quick-Bird multispectral scene (2.8-m cell size) of a residential area in Fort Collins, Colorado. Thumbnail to the right shows detail of the lower right corner of the image.

Pan-sharpened to 0.7-m cell size using QuickBird calibration

Pan-sharpened natural-color composite produced in the Multiresolution Fusion process from this QuickBird scene using the sensor-tailored calibration. The result using the Paris color fusion method is a 0.7-m color image with proper color balance.