

# Contrast Enhancement for Local Areas

Aerial and satellite images may include very bright areas (such as clouds, snow) and very dark areas (such as water) in addition to your areas of interest. If these bright or dark areas are extensive, their influence on the brightness histograms for the entire image may make it difficult to design appropriate contrast and color for your areas of interest. The Raster Contrast Enhancement window in TNTgis allows you to design contrast enhancement using the image characteristics of any portion of the displayed image. You can designate the



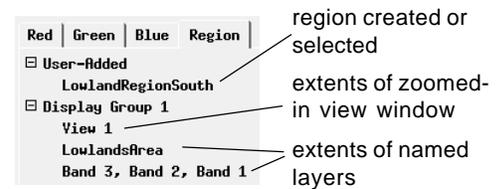
Extract of a Landsat scene displayed using bands 3-2-1 to produce a natural color display. The scene includes clouds, snow cover in high altitude areas, a volcanic eruption cloud (top), and ocean. The yellow polygon is a region outlining a vegetated lowland target area to be enhanced.

desired area by zooming in with the View window, using the extents of another layer in the View, by creating a region, or by selecting a previously-saved region object.

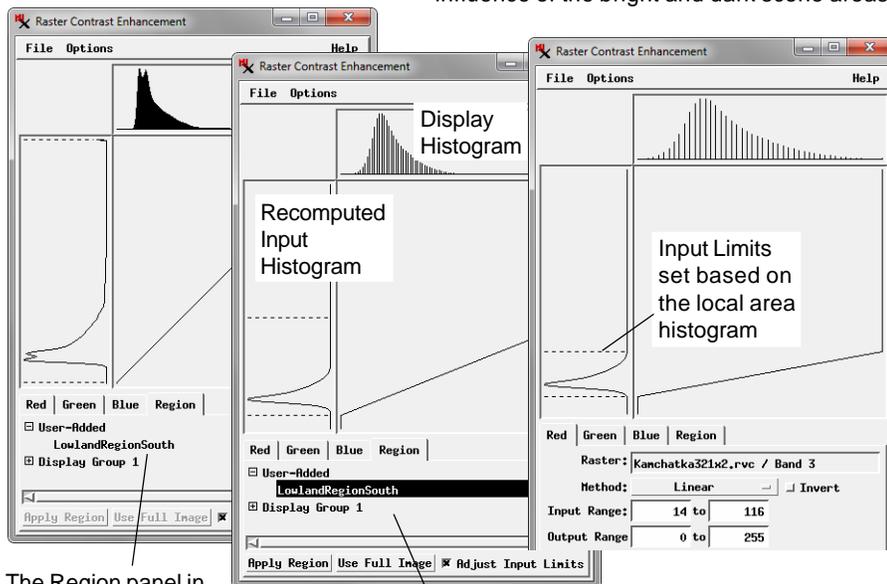


Zoomed-in view of part of the lowland area with normalized contrast based on the histograms for the entire image. This display of the lowland has poor contrast and color due to the influence of the bright and dark scene areas.

The Region tabbed panel in the Raster Contrast Enhancement window presents a selection list with expandable entries for each display group and one labeled User Defined. The User Defined section automatically lists any regions you have created or selected in the current session using the GeoToolbox. Each display group section includes an entry for each layer in the group (representing the spatial extents of the layer) and a View entry for any view window that has been zoomed in to show only a portion of the group (representing the spatial extents currently shown in that view).



To use a region, layer extents, or View extents to recompute contrast, left-click on the desired entry in the Region panel listing to select it and press the Apply Region pushbutton at the bottom of the panel. Histograms for each of the displayed image bands are immediately recomputed based on the region selected. If the Adjust Input Limits toggle is turned on (the default), the Input Range limits are also automatically adjusted to match the ranges of the new input histograms. You can then make any additional desired adjustments before saving the contrast tables. You can revert to using the full image area by pressing the Use Full Image pushbutton. (continued)



The Region panel in the Contrast Enhancement Window includes selections for the current layers, zoomed-in views, and any region that is created or selected using the GeoToolbox in the current display session.

Choosing a region and Pressing the Apply Region button recomputes the Input histogram and display histogram for the selected area for each image band.

Using the histogram(s) for the selected local area, you can adjust input limits and other contrast parameters to tailor the contrast enhancement to that area, as shown above for the Red band of the sample image.



View of the lowland area with Linear contrast designed using local histograms for the lowland region. This display of the lowland area has better contrast and color than the view with global normalized contrast.

If your selected contrast method is Normalize or Equalize, updating to a local histogram significantly different from the global histogram will immediately produce a noticeable difference in color and contrast in the View regardless of whether the input limits are automatically adjusted. These contrast methods rely on the detailed distribution of values within the input histogram to determine the output histogram and resulting contrast, so any change in the input histogram automatically affects the computed display histogram.

The Linear, Exponential, and Logarithmic contrast methods rely on the Input Range limits to determine the spread of output

display values, so it is advisable to allow these limits to be automatically adjusted when the input histogram is updated. The automatically adjusted range limits may not directly produce the desired contrast and color. But you can use the recomputed input histogram for your local area of interest (view-based or region-based) to further adjust the input limits and other contrast parameters to get the desired brightness, contrast, and color for this local area. At any point you can save the contrast table(s) based on these local histograms. You can save contrast tables for local areas in addition to those based on the whole image.

