Scripts by Jack™

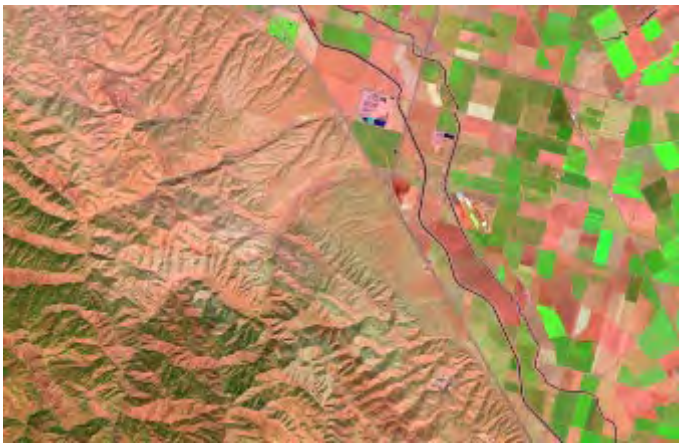
Correct for Terrain Induced Radiance Effects

The TERCOR geospatial script corrects Standardized Reflectance Factor Index (SRFI; see the *Scripts by Jack* color plates entitled *Calibrating Multispectral Satellite Images* and *Calibrate Satellite Images to Surface Reflectance*) values in all calibrated bands for the predictable illumination variations caused by terrain slope and aspect. To make these corrections, the script uses cell values in a shading raster object that you have previously computed from a matching elevation raster object (using sun elevation and azimuth angles appropriate for the image) in the TNT Slope, Aspect, and Shading process. SRFI values are adjusted as needed in hilly areas but remain unchanged in areas of flat terrain.

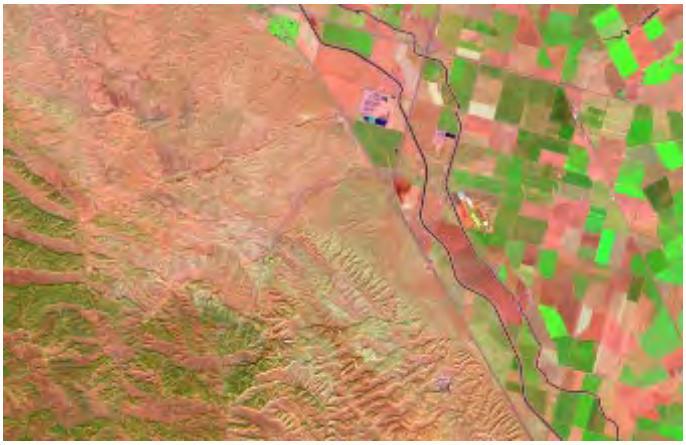
The TERCOR script differentiates direct solar illumination from diffuse skylight (which does not contribute to terrain shading) when it makes the shading adjustments. Skylight arises from atmospheric scattering; increasing haze increases the fraction of illumination due to skylight while decreasing the direct illumination fraction. Both haze and skylight also vary predictably with wavelength. The script prompts for a skylight fraction for the green-light image band, then uses this value to compute skylight fractions for the other bands using a power-law model based on band wavelength. Documentation for the TERCOR script is provided in *FAQs by Jack Part D*.

TERCOR.SML sample results for Landsat 7 extract from central California, USA

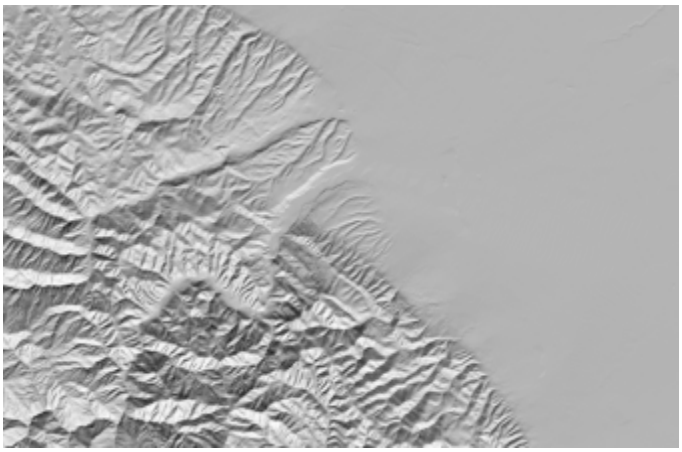
False-color displays with RGB = Band 7, Band 4, Band 2, respectively. Vegetated areas appear green.



Scaled-reflectance bands produced by the SRFI script retain terrain-induced brightness effects in the hilly area in the southwest half of image.



Processing with TERCOR.SML greatly reduces terrain shadowing in the southwest half of the image and more clearly reveals the ecological zonation of vegetation in this area. North-facing slopes have a more humid microclimate and denser green vegetation (shrubs and trees), while the more arid south-facing slopes are mantled with senescent grass and soil in this dry-season image. Band values in the flat agricultural area in the northeast portion of the image were not altered by TERCOR processing.



Shading raster from 30-m DEM, used by the script to correct reflectance values for terrain effects.

The TERCOR script works best with orthorectified satellite images. Terrain-induced relief displacement in unrectified images causes variable registration errors between image cells and shading raster cells in hilly areas. The misregistered cells may have the wrong shading correction applied, producing brightness artifacts in the terrain-correct image. These artifacts most commonly appear as localized bright and dark fringes along ridge tops and valley bottoms.

Dr. Jack F. Paris, a private remote-sensing and geospatial consultant/coach, has developed a collection of advanced, model, geospatial ***Scripts by Jack™*** and associated documentation called ***FAQs by Jack™***. These scripts are in the public domain and can be used and modified as desired. For access to the scripts and FAQs, more information, and contact with Jack, go to: **www.microimages.com/freestuf/ScriptsByJack.htm**