

## THE RELIEF SHADING APPLIED IN SATELITE IMAGE MAPS

Waldemar Rudnicki

*Institute of Geodesy and Cartography*

*00-950 Warsaw, Jasna 2/4, POLAND*

*e-mail: [waldek@igik.edu.pl](mailto:waldek@igik.edu.pl)*

*fax. (+48-22) 8270328*

It is a well known fact that in order to achieve proper (true) perception of relief in a satellite image or in aerial photograph one has to turn it upside down. Satellite images and aerial photographs of the areas located in Northern Hemisphere are collected during morning hours, when sun light comes from S/E to S direction. Human eye, however, is accustomed to perceive the relief properly, when the imaginary light source is located to N/W of the image.

To overcome this discrepancy, many authors of satellite maps and ortophotomaps simply turn the image by 180 degrees and create a product with South direction at the top. While working on the creation of 1:50 000 Landscape Map of the Karkonosze National Park in Poland, I have applied another approach to the problem of relief perception.

The map is based on SPOT (multispectral), IRS-1C (panchromatic) data, aerial photographs and Digital Terrain Model obtained from 1:25 000 topographic map.

The real sun angle at the moment of acquisition was calculated for each of the component images. Next, a shading image assuming opposite (differing by 180 degrees) direction of sunlight was generated for each of them. By applying various techniques of merging continuous-tone images, an effect of shade inversion with concurrent compensation has been achieved. At this stage of the process the result is the image with the original shades removed. With some simplification one can say these parts of the processed image remained unchanged which had medium grey value in corresponding shading image. The lighter areas were darkened and the darker ones brightened.

As the time of acquisition of images used for the map have been different, the correction for artificial light source situated exactly in N/W had to be introduced to each portion of the map. During final processing stage, the original true shades are entirely removed from the flat areas of the map (i.e. areas of medium grey value in its shading image).

The true relief of this mountainous terrain can now be clearly perceived.