

DIGITAL TERRAIN MODEL OF THE ISLAND OF NEWFOUNDLAND

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Digital terrain models produced from the digitized contours of the NTS 1:250 000-scale maps, supplied by the Department of Natural Resources, Surveys and Mapping Division, Ottawa, provide an interesting enhanced 2-D display of the topographic surface, which is commonly influenced by bedrock structures. A 1:1 000 000-scale mosaic of the Island of Newfoundland has been compiled portraying the terrain and the underlying structure as colour and monochrome shaded-relief images.

The images were created for each NTS 1:250 000-scale map and then merged for processing and plotting. The contours for each individual map sheet were profiled (IDRISI, 1993) to produce an elevation matrix at 100 m intervals and then a continuous surface was calculated from this matrix using an iterative, minimum-curvature, surface-fitting technique (GEOSOFT, 1993; Mitsova, 1993). The matrix consists of 3079 cells east-west, and 3076 cells north-south. Each cell covers 200 m on the ground (0.2 mm at 1:1 000 000 scale). Elevations of major lakes and ocean areas were stamped into the image to mask any apparent relief in these regions.

A monochrome image (Figure 1) was produced using a method known as analytical hill shading. A false sun was positioned in the northwest with a 25° angle of incidence. Areas on which the sun shines directly appear as white; flatter areas appear grey; areas in shadow (away from the sun) appear as dark grey or black. This image gives a good presentation of the underlying bedrock structure in areas where till cover is fairly thin (e.g., Northern Peninsula). In areas of extensive till cover, the image appears relatively smooth (e.g., central and eastern Newfoundland).

A colour shaded-relief image (Figure 2) was produced using methods commonly employed by geophysicists to display aeromagnetic data. The elevation matrix was plotted with colours ranging from blue in low areas to a brownish-red in

high areas (819 m). The shaded-relief was again calculated using a false illumination from the northwest with a 25° angle of incidence. The combination of colour to display elevation and grey shades to portray relief gives an impression of structure while also showing the elevation above sea level.

The contours from the 1:250 000-scale topographic maps have an interval of 100 feet (30 m), which is sufficient to provide detail in a terrain model at scales greater than 1:250 000. The 1:50 000-scale topographic maps that have a contour interval of between 30 and 50 feet, depending on the age of the map (10 and 15 m), can provide enough detail to be used to create terrain models at scales between 1:50 000 and 1:250 000. As more 1:50 000-scale map sheets become available in digital form and as the accuracy of these maps is improved through the use of digital stereo photogrammetry, a set of more detailed terrain models will be developed from them. These terrain models can be used as another layer in a digital atlas as a background for overlaying thematic data (Figure 3), in modelling programs for extracting drainage basins and various other functions.

REFERENCES

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Figure 1. *Monochrome digital terrain model of the Island of Newfoundland; false illumination from the northwest. Scale 1:3 000 000.*

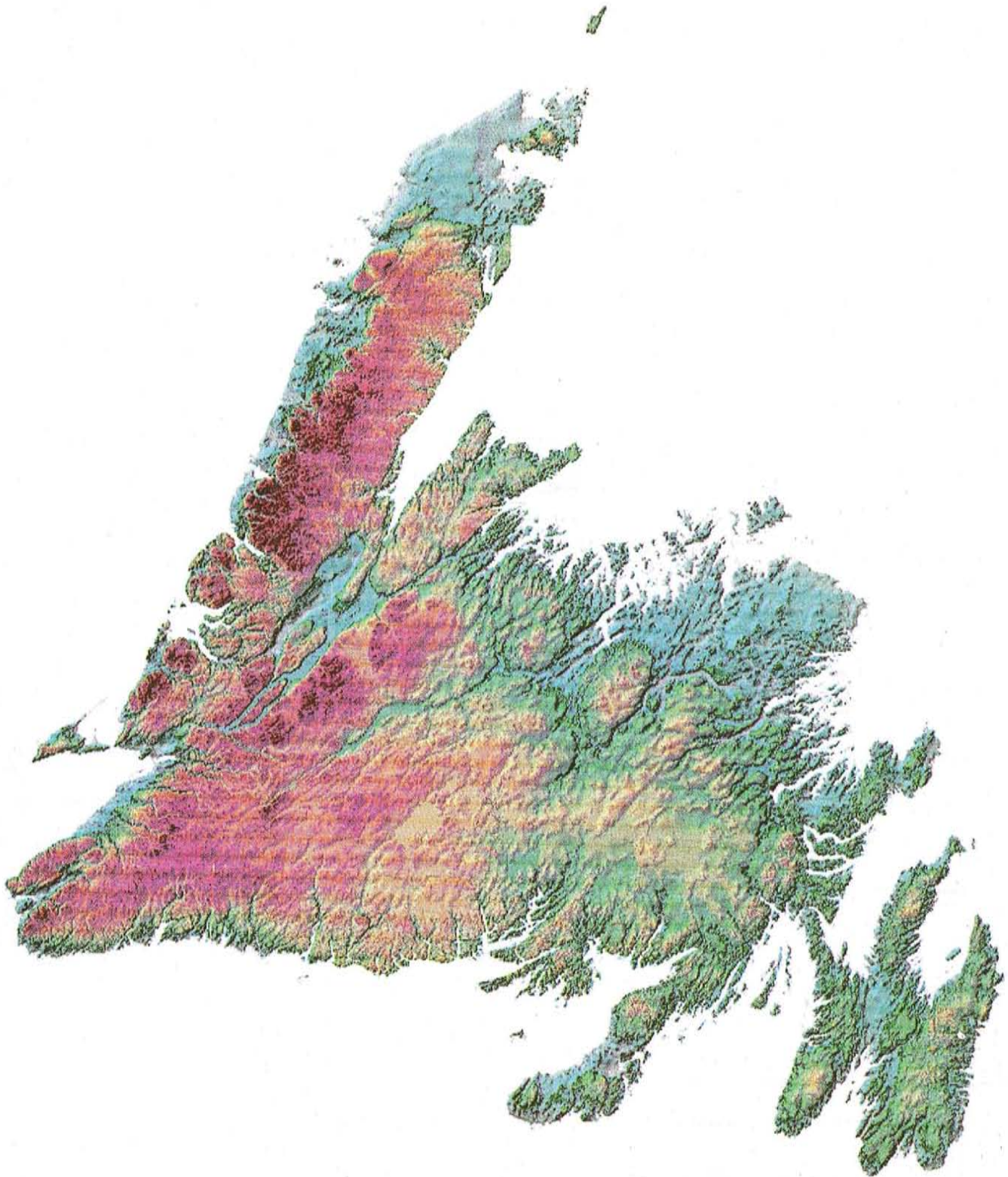


Figure 2. *Colour digital terrain model of the Island of Newfoundland; false illumination from the northwest. Scale 1:3 000 000.*



Figure 3. Geology draped over digital terrain model of the Red Indian Lake map sheet, NTS 12A; false illumination from the northwest. Figure also shows massive sulphide occurrences and bedrock geology draped on shaded topographic surface.

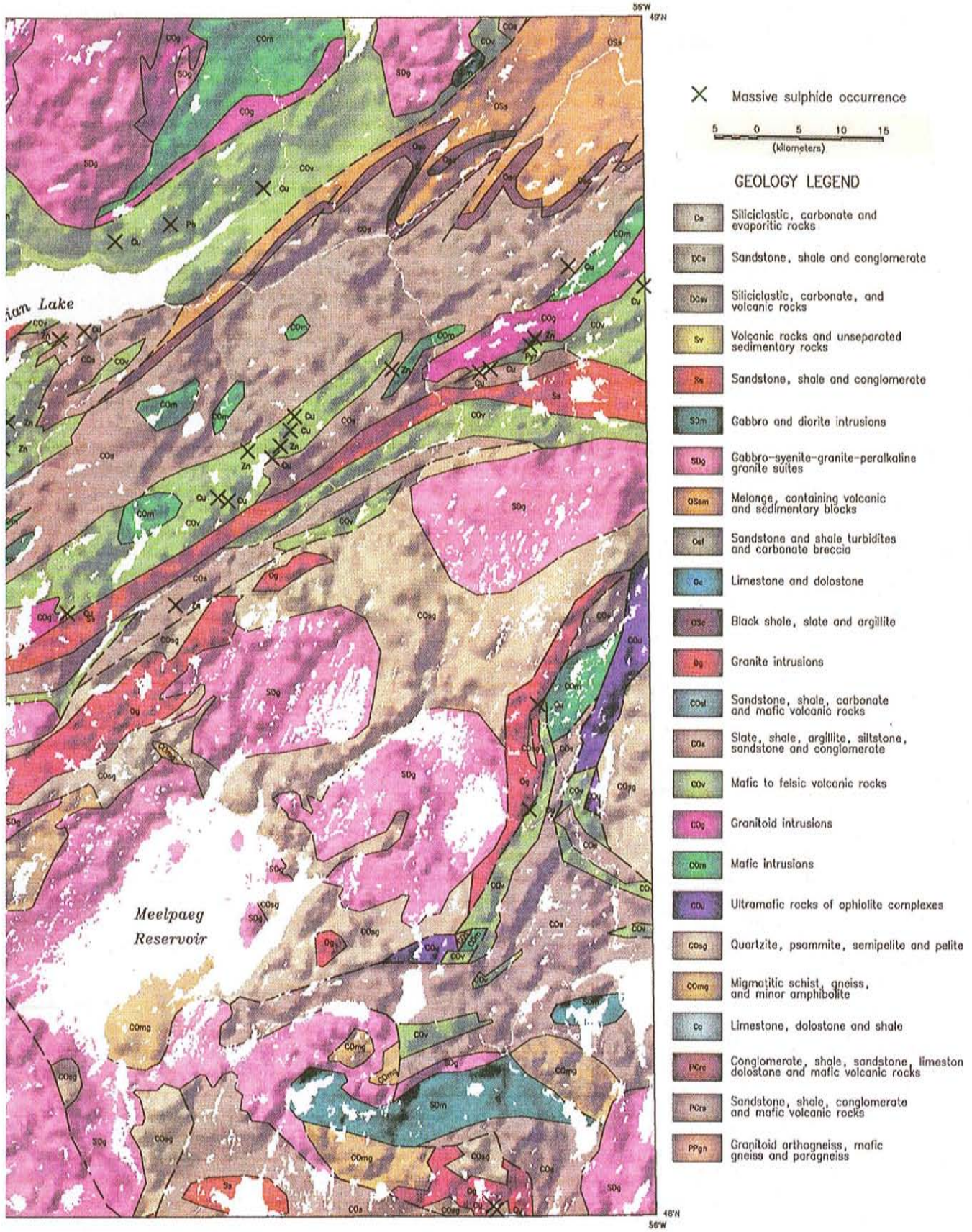


Figure 3. Continued.