Digital terrain model for Cape Breton Island, Nova Scotia

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The growth of digital data banks and the development of new techniques for processing and analysis of field measurements are revolutionizing the interpretation of geoscience information. A variety of data sets are now available, but the most important data on topography are still elusive and difficult to obtain.

Digital Terrain Models (DTM) can be constructed using high resolution satellite imagery (e.g., collected from French satellite SPOT) or by digitizing existing topographic maps. The first approach can produce excellent grids with a horizontal accuracy of few tens of metres and a vertical resolution of one metre or better. Unfortunately, the cost of this approach is high and not readily available to academic researchers.

We describe a method of digitizing published topographic maps that is practical and applicable on any scale. The method was applied to Cape Breton Island and a DTM at 250 m grid spacing was produced following these steps: (i) Contours on published maps at 1:250,000 scale were enhanced by tracing and the spacing was equalized by thinning out some contours in areas

of high topographic relief and by adding point values in flat areas; (ii) The contours were digitized using AUTOCAD (TM) and the data was plotted as a contour map at the same scale as the original topographic sheets to check for the accuracy of digitizing; (iii) The resulting digital data file was converted from PC to uVAX computer; (iv) This raw data file was converted from PC to interpolation using a Minimum Curvature algorithm; (v) The grid was plotted as a coloured relief map and data was edited if any discrepancies were discovered. At this scale, the Cape Breton example (4 topo sheets) took about three weeks.

The method produces a generalized DTM that can be used at scales of 1:500,000 or smaller, for a general representation of topography and for correction of gravity and magnetic surveys. The accuracy of the method was evaluated by comparison with a file of gravity stations which contained accurate elevation data over a vertical range of 600 m. There was no systematic discrepancy between the gravity station and the nearest grid location elevations. The overall agreement between the two sets was within ±50 m. As would be expected, the larger differences were in the areas of greater relief.