UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
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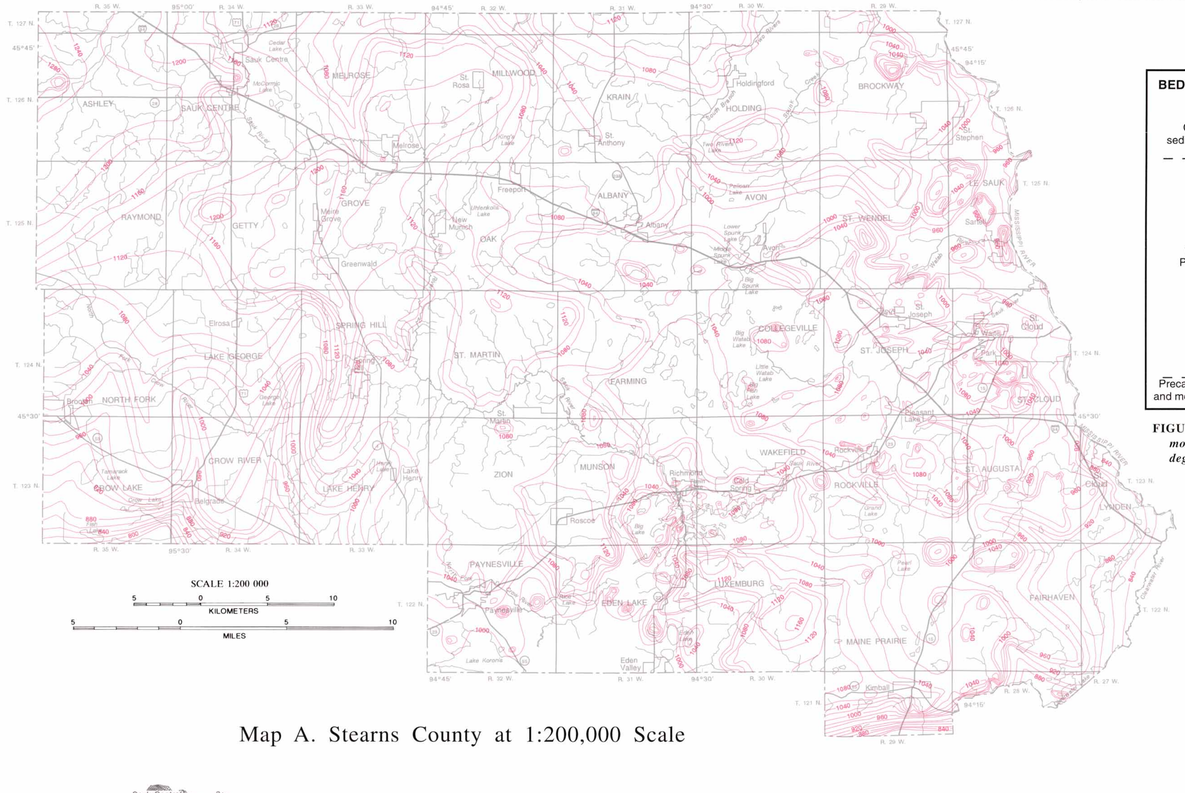
COUNTY ATLAS SERIES
ATLAS C-10, PART A
Plate 6—Bedrock Topography



Map A. Stearns County at 1:200,000 Scale

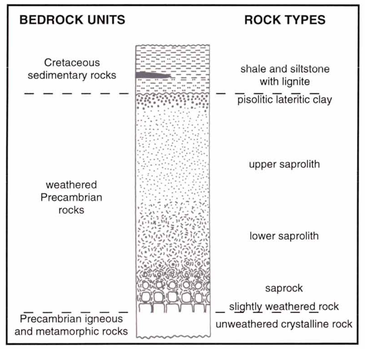


FIGURE 2. *Any of three bedrock units may form the uppermost bedrock surface in Stearns County, depending on the degree of erosion. See text for discussion.*

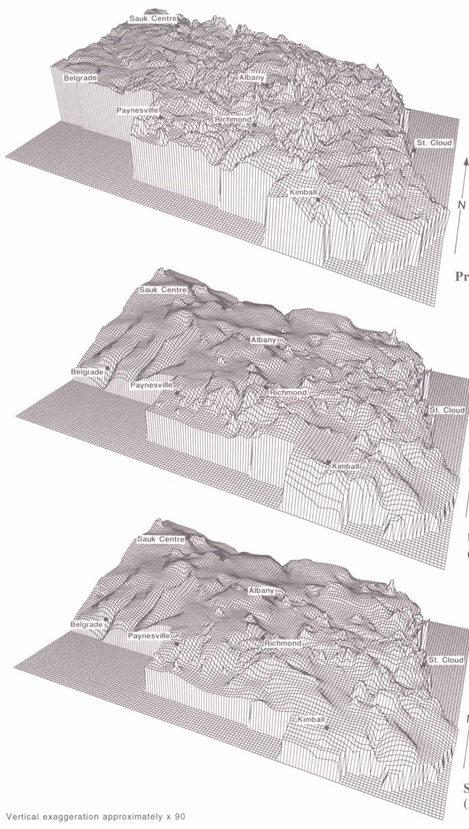


FIGURE 1. *Digital topographic models of the land surface, the uppermost bedrock surface, and the Precambrian bedrock surface in Stearns County. See text for discussion.*

INTRODUCTION

The configuration of the bedrock surface was determined from water-well records, outcrops, seismic refraction measurements, and Rotasonic drilling. Topographic contours were drafted by hand at a twenty-foot interval and then digitized.

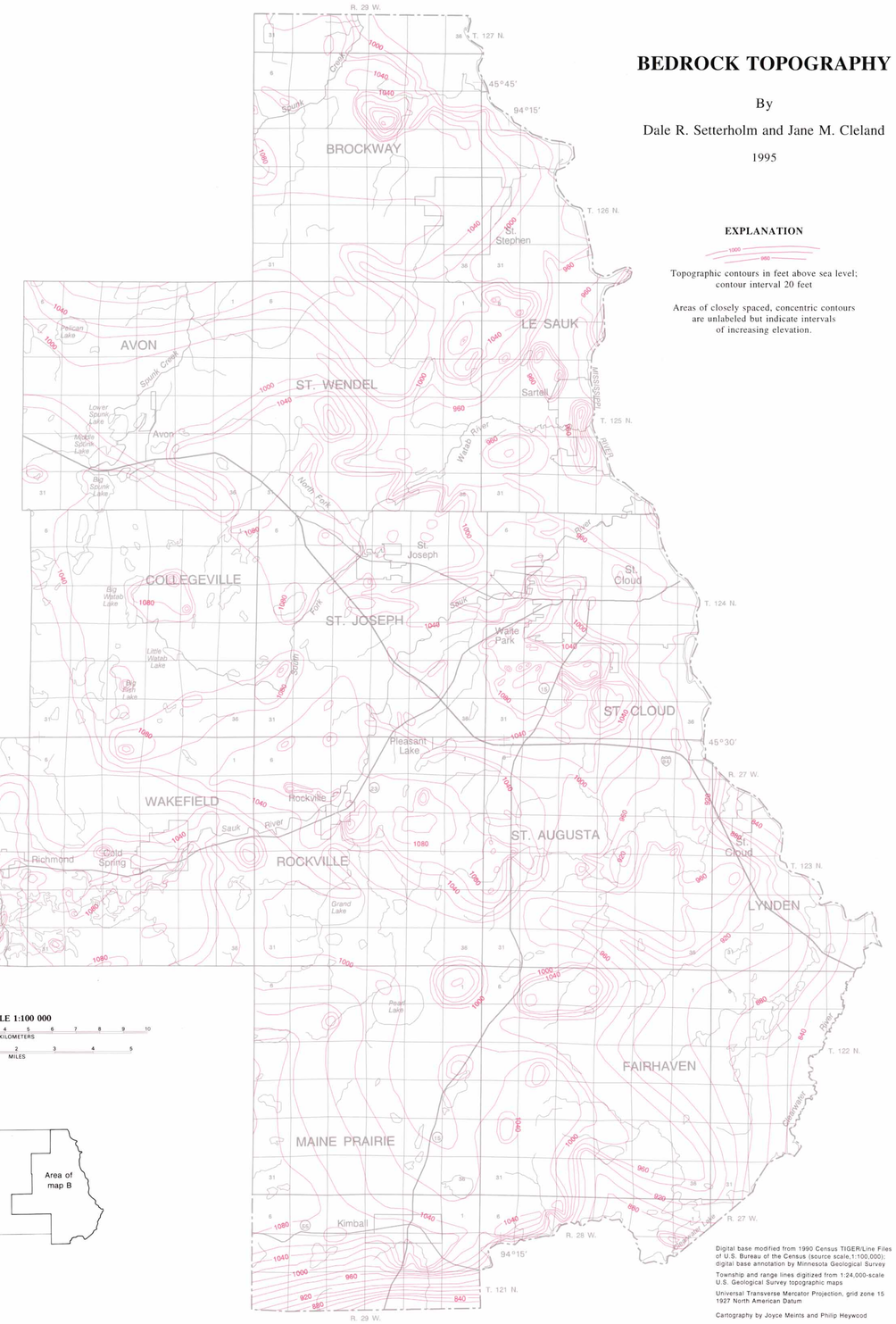
Also included on this plate are three-dimensional wire-model diagrams of the land surface, the uppermost bedrock surface, and the sub-Cretaceous bedrock surface (Fig. 1). The cells that make up the model measure 500 meters on each side; the perspective view is from 25° east of south and 30° above the base (750 feet above sea level). The land-surface model was derived from the U.S. Geological Survey one-degree Digital Elevation Model. The data for the bedrock surfaces were sampled from data grids derived from hand-contoured maps.

Three major bedrock types are found in Stearns County (Fig. 2). The bedrock can be Precambrian crystalline rock, a clay-rich saprolith formed by weathering of the crystalline rock, or sedimentary bedrock of Late Cretaceous age. The depth to which the bedrock sequence has been eroded determines which unit forms the uppermost bedrock surface. The distribution of residual Cretaceous rocks is shown on the bedrock geologic map (Plate 2). Saprolith is generally present beneath the Cretaceous strata, and is partially or totally eroded where they are absent.

The configuration of the sub-Cretaceous bedrock topography (Fig. 1) shows a strong correlation with the bedrock units as mapped on Plate 2. The high ground of the northwest corner of the county is underlain by Archean gneiss. The irregular ridge and valley topography of the southwestern corner of the county is underlain by metavolcanic and metasedimentary rocks of the Mille Lacs Group. A northeast- to southwest-trending band of relatively flat terrain with elevations from 1040 to 1080 feet above sea level crosses the center of the county and corresponds to occurrences of the Little Falls Formation, a staurolite schist. A granite knob within this band stands above the schist near the center of the county. Areas underlain by the Sartell Gneiss, in the northeastern part of the county, lie mostly below 1040 feet above sea level and include a shallow basin filled with Cretaceous strata. The southeastern quarter of the county is underlain by rocks of the Stearns granitic complex. As does the area underlain by the Sartell Gneiss, the granitic terrane shows the effects of intense chemical weathering that was largely controlled by the spacing and orientation of fractures in the bedrock. This produced knobs of relatively unfractured rock separated by linear zones of thick saprolith that have since eroded. The dimension-stone industry utilizes some of the less fractured knobs. The irregularity of the sub-Cretaceous bedrock topography of this part of the county was probably largely responsible for preserving the remnants of Cretaceous rocks that occupy its low areas. Elevations of the sub-Cretaceous bedrock surface in this area are as low as 820 feet above sea level and as high as 1120 feet above sea level. The eastern and southeastern borders of the county are marked by some of the lowest areas of the bedrock surface and these drainages may mark the earliest development of the Mississippi River drainage.

ACKNOWLEDGMENTS

Partial funding for this project was approved by the Minnesota Legislature (M.L. 91, Ch. 254, Art. 1, Sec. 14, Subd. 4[F], and M.L. 93, Ch. 172, Sec. 14, Subd. 11[g]) as recommended by the Legislative Commission on Minnesota Resources from the Minnesota Environment and Natural Resources Trust Fund.



Map B. Eastern Stearns County at 1:100,000 Scale

BEDROCK TOPOGRAPHY

By

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1995

EXPLANATION

Topographic contours in feet above sea level; contour interval 20 feet

Areas of closely spaced, concentric contours are unlabeled but indicate intervals of increasing elevation.

GEOLOGIC ATLAS OF STEARNS COUNTY, MINNESOTA