EXPERIMENTS IN MODEL MAP MAKING

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A. The Model. Expressions of relief by contour lines as featured on topographic maps is, and perhaps ever will be, the most valuable contribution to the art of relief mapping. When to this feature, as Major Roberts points out, is added a superimposed "high light photograph of an accurate relief model on a contoured base of the same area, a contoured map with the addition of an apparent third dimension results" especially helpful to "commercial firms and designers of engineering projects."[1]

The converse of this principle as applied to relief modeling seems to the writer to be equally true. The superposition of contour lines on the bas relief assists in forming the relative altitude perspective, and, in special cases at least, continuous line data seem quite essential in elucidating relationships of physiographical, structural, and historical geology phenomena.

It occurs to the writer, then, that in the making of a single local laboratory relief model by the conventional method of superimposing layers of cardboard or other material cut to conform to successive contours, a mistake is made in the modeling process of covering up the edges of the successive layers which might well serve as contour lines on the finished model.

The object of the present experiment was to bring out this contour feature on a relief model, and otherwise to elaborate on as many details as could well be shown to make the model a truly instructive device of the laboratory instead of just another mural decorative fixture.

The technique of model construction in current usage is excellently detailed and illustrated by Major Roberts.[2] Methods employing apparatus for modeling are reported which appear to expedite matters very much and, it is hoped, may lend themselves to incorporating the contour feature on commercial models.[3 4]

The writer's model was constructed without the aid of any special apparatus, a process admittedly very time-consuming. Tracing and cutting of cardboard along contour lines was participated in by the class in Physiography. A dark red cardboard was used to make the contours more conspicuous. Following this, the layers were successively mounted with glue, and the whole unit securely affixed by means of screws to a baseboard.

[1] Roberts, L. B., "Topographic Mapping." The Society of American Military Engineers, p. 63, 1924.

[2] Op. cit., pp. 63-70.

[3] Gradenwitz, Alfred, "Quantity Production of Relief Maps." Scientific American, March, 1922, p. 178.

[4] Holmes, Chauncey D., "A Method of Making Topographic Models." Science, 73:368-369, 1931.

The mounting completed, the next step was to find a suitable molding substance. Several, including plaster paris, were tried with more or less indifferent results. The present situations calls for a molding material which applies readily, smoothly and securely; sets sufficiently slow to allow for fashioning; adhering well enough to the cardboard; and upon hardening presenting a reasonably hard, smooth and preferably white finish. Perhaps the most important quality is a tenacity of adherence on account of the interrupted molded surface. Everything considered, "rough coat plaster," as it is known in the builder's trade, seems to satisfy the requirements best.

The molding finished and smoothed, the contour model is now ready for coloring to show drainage and areal geology features. Precaution is necessary to apply the tints very lightly so as not to obscure the contour lines.

Lettering, or labelling, was tediously but neatly done by means of single solid rubber type, two styles of fonts being used. Finally, a coat of shellac was applied to bring out both the print and the contour lines, besides imparting luster and finish to the surface.

Considerable expenditure of time being involved in the construction of a model of the above type, it behooves one to select as a prototype area to be modeled a region abounding in diversity of landscape forms and geologic phenomena, preferably a region in which field trips are regularly conducted, thereby stimulating sustained interest in field studies.

The prototype of the present model is the Calumet, Illinois-Indiana, quadrangle, which as far as the writer is aware, has not previously been modeled, except on a very general scale as part of a much larger landscape unit. The region, as part of the greater Chicago area, affords a rather unusual combination of geologic-geographic phenomena. Red rock exposures are featured by the extensive limestone quarry of the Brownwell Improvement Company at Thornton, the largest quarry in the state of Illinois, and in the abandoned quarry at Stony Island, both famed for their coral reef structures of the Niagaran rock system. Physiographic phenomena include the Valparaiso Moraine and the Chicago lake plan with its three epochal and other minor shore line beaches partly modified into minature dunes, together with three conspicuous lake plain islands, and the associated historically interesting drainage phenomena of the Sag outlet and the Calumet River. In this quadrangle contour lines take on a peculiar significance in their relation to the position and elevation of the "fossil" beaches and islands of the ancient lake plain.

The cultural features are typical of a region tributary to a metropolitan commercial and industrial center, partly evidenced by the convergence of the railroads and the arterial highways, exhibiting the influence of the southerly extension of Lake Michigan.

B. The Map. The second experiment involves an enlargement and elaboration of Lobeck's well known Physiographic Diagram of Europe. This diagram together with that of the United States by the same author, it will be recalled, employ a physiographic symbolism scenically expressive of types of rock structure and land forms.

The present cartographic project grew out of a desire for a wall size reproduction of Lobeck's Diagram of Europe presently available only in desk copy size (18" x 23"). It was desired, moreover, to have the map show complete labeling of the physiographic forms and provinces as enumerated and discussed by the author in the published text which accompanies the map, and finally, to utilize this base for representing comprehensively all the essential types of mappable geographic phenomena consistent with legibility, whether physical or cultural, thus bringing into juxtaposition and superposition all the essential geographic factors in their proper setting and relationships, results not so readily realized where a separate map must be consulted for each class of geographic data, and these perhaps on different scales. Thus one map of a continent may show relief, a second political boundaries, a third climatic phenomena, a fourth economic features, etc.

Granting that it may not be possible, or even practicable, to attempt to show on one map all geographic data, the viewpoint is taken that one wall map large enough to accommodate most of the essential material is worth more than many scattered smaller maps with varying scales.

With this basic unification and correlation principle in mind, the writer, with the assistance of the students in Geography of Europe, set out first to enlarge the diagram referred to. This was done by dark room projection onto a screen consisting of the paper on which the wall map was to be drawn. The bare major physiographic outlines as projected were then hastily traced in pencil, the work being done in sections.

The tracing of the projection completed, the next step consisted in revising or refining the outlines, and reproducing in ink the details of the diagram, whereupon the sections were ready for trimming, matching, and finally mounting on muslin.

Next, political boundaries were drawn in, and the countries set off in colors. This latter feature was accomplished by cutting out a paper stencil for each country, using this as a mat while subjecting each country in turn to a spray of transparent water color. Such colors should be of the lightest tints and applied with the finest spray possible to guard against obscuring the previously sketched physiographic details. The spray thus properly applied produces pleasing streak-free color effects comparing very favorably in this respect with commercial products of map publishers.[5]

The geologic section of Lobeck's diagram was reproduced at the bottom of the map. Climatic regions are set off by numerals and boundary lines in green according to nomenclature found in Regional Geography by Preston E. James (1929).

Labelling or printing was done by means of solid rubber type, several sizes and styles of fonts, and colors being used to further differentiate the various classes of map data. These entries were left largely for the student to supply, thereby affording an opportunity to build up a correlation background of the course material.

To extend the comprehensiveness of the chart, one-half of Lobeck's text was mounted on either side, and these together with the map

[5] The sprayer used is of the adjustment type, manufactured by the G. V. Sprayer Co., Wichita, Kansas.

framed by a series of specially selected type illustrations from the National Geographic Magazine. Thus we have a synthetic panorama representing a composite unit of geologic, physiographic, climatic, political, and cultural features, leaving economic data still to be supplied by a later class.

The size of the chart is 11 feet 3 inches by 6 feet 4 inches, the map itself being 7 feet 7 inches by 6 feet.

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