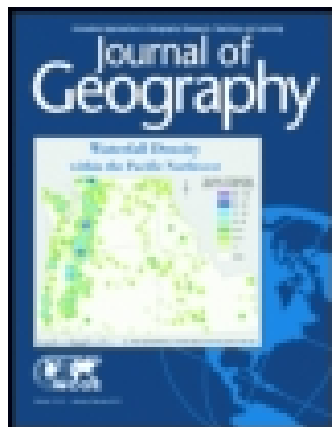


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A SIMPLE AND RAPID METHOD FOR MAKING RELIEF MODELS FROM CONTOUR MAPS

By LEON AUGUSTUS HAUSMAN

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IN teaching physical geography it is the common experience of instructors that nearly all pupils find difficulty in comprehending contour maps. Hence any means that will facilitate a positive interpretation of the details of the relief as shown on the contour map can not fail to be of great help in leading to an intelligent reading of such maps. Particularly is this true if the home region can be studied in such manner, for the pupils will all be more or less familiar with its topography and consequently will be more than ordinarily interested in its graphical representation.

The construction of a relief model of course immediately suggests itself as the solution of the difficulty. But two objections to such an attempt are encountered almost at once. If the modelling is done on a sand table the forms produced will be so crude and inaccurate as to be unrecognizable. If, on the other hand, an exact reproduction is attempted, the amount and kinds of material needed, the technical difficulties, and the skill and extent of the labor involved make the work altogether impracticable for secondary school pupils, if the usual procedure in making such models is followed.

In connection with some work that involved the construction of a number of models of small size, a method for making these rapidly and accurately was devised by the writer in the Physiography Laboratory at Cornell University. The procedure is so simple and the materials required so inexpensive and easily procured that their making seems quite feasible for pupils of secondary schools. The scheme is accordingly presented here in the hope that it may be adopted by others and that it may lead to a clearer understanding of topographic maps by students of physical geography.

The essential materials and implements are:

1. a pantograph (the wooden form is much cheaper than the metal one, and for this work, just as satisfactory)
2. a wooden rolling pin
3. a drawing board
4. Plasteline, five to ten pounds *

* This is a composite modelling clay and may be obtained from A. H. Abbott & Co., 127 N. Wabash Ave., Chicago, Ill., at a cost of from twenty to twenty-five cents per pound.

5. plaster of Paris, five to ten pounds.

If the topographic sheet for the home locality has been issued by the U. S. Geological Survey, the greatest interest can, without doubt, be secured by making the first relief model a reproduction of the part of this sheet adjacent to the school.

As a great majority of the contour maps that have been issued are on the scale of one inch to one mile, it will immediately be apparent that in order to show the region about the school for four or five miles in every direction it will be well to have the horizontal scale twice or three times as large as that on the map. The pantograph is accordingly set to enlarge to the desired size and a sheet of rather heavy, smooth, white paper firmly affixed to the drawing board, at the points determined by the adjustment of the pantograph, by means of thumb tacks. The section of the contour map desired for reproduction is fastened in the same way. Before beginning the work it will be worth while to give consideration, first to the degree of relief presented by the region to be modelled, and second to the extent to which it is proposed to exaggerate the vertical scale. If the region is one of say four or five hundred feet difference in relief within the area to be modelled, it will probably suffice to trace out (as described below) only the hundred-foot contours. If, on the other hand, the region is one of very low relief, where, for example, five-foot contours are used on the map, it may be necessary to trace out every ten-foot contour line in order to reproduce the slopes with accuracy.

The vertical scale will, in any event, undergo exaggeration, hence it should be the aim of the modeller to keep the exaggeration as slight as possible, and yet give an adequate notion, in the finished model, of the actual relief. Consideration must also be given to the thinness to which the Plasteline can be successfully rolled, probably about one-eighth inch will be found as thin as can be readily handled.

Trace over and enlarge, on the white paper, the lowest contour line on the area to be modelled, and cut this out evenly with scissors. Next, roll out a sheet of the Plasteline about one eighth of an inch thick. This is best done roughly with the palms of the hands and then smoothed out with the rolling pin. Lay the paper outline of the enlarged contour, that has just been made, on the sheet of Plasteline and cut the latter into a replica of this paper contour. Fasten this to any suitable board, and the model is begun, as shown in Fig. 1. Trace and cut the paper for successive similar contour intervals, reproducing them in sheets of Plasteline, and build up the model in steps or terraces. This will result in a land form of some such appearance as that shown in Fig. 2.

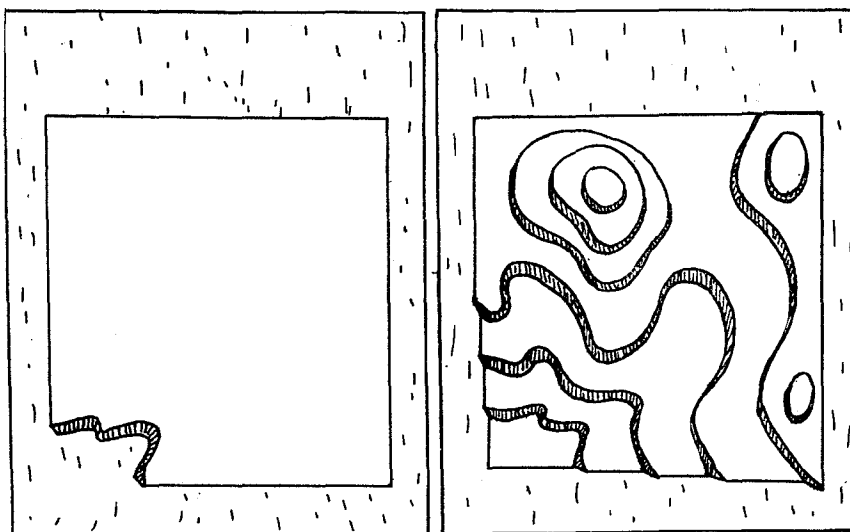


Fig. 1

Fig. 2

Fig. 1. Board with first contour of Plasteline in place.

Fig. 2. Model Built up in Terraces.

The model having been built up to the highest contour in this way, it remains only to reproduce the topography of the slopes between the terraces as determined by the intermediate contours of the map. This is best done by hand. Great care should be exercised to duplicate all the details of the topography. This work of smoothing out the slopes must be done with the original contour map before the modeller, and he should continually be comparing it with the model. In this endeavor to interpret and to reproduce the details of the topography of the region will be found one of the most valuable educational factors of the scheme. Fingers make the best modelling tools for such work, though there will always be deep valleys and ravines that will require the use of some such simple implement as a blunt spatula whittled from the end of a penny ruler. For very deep ravines and gorges a dull pencil will serve. The surface of the Plasteline must be rubbed quite smooth and glossy with the balls of the fingers before the model is ready for its final detailed sculpturing.

If only a temporary model is wanted, no further manipulation is necessary. The original Plasteline model will in some cases answer every purpose, for it may be satisfactorily painted; rivers, lakes, and cultural features put on in their proper places and in the colors of the contour map. But as the Plasteline is mixed with oil to insure its permanent plasticity, the paint will

not dry out thoroughly and in the course of a week or two may become discolored, due to the penetration of the oil from beneath. It is better, therefore, if the model is desired for permanent preservation, to make a cast of the original Plasteline model in Plaster of Paris. Making casts of such simple objects as land forms is not at all difficult. For directions the reader is referred to: Frederick, F. F. "Plaster Casts and How They are Made." (W. T. Comstock, 23 Main St., N. Y., \$1.50.)

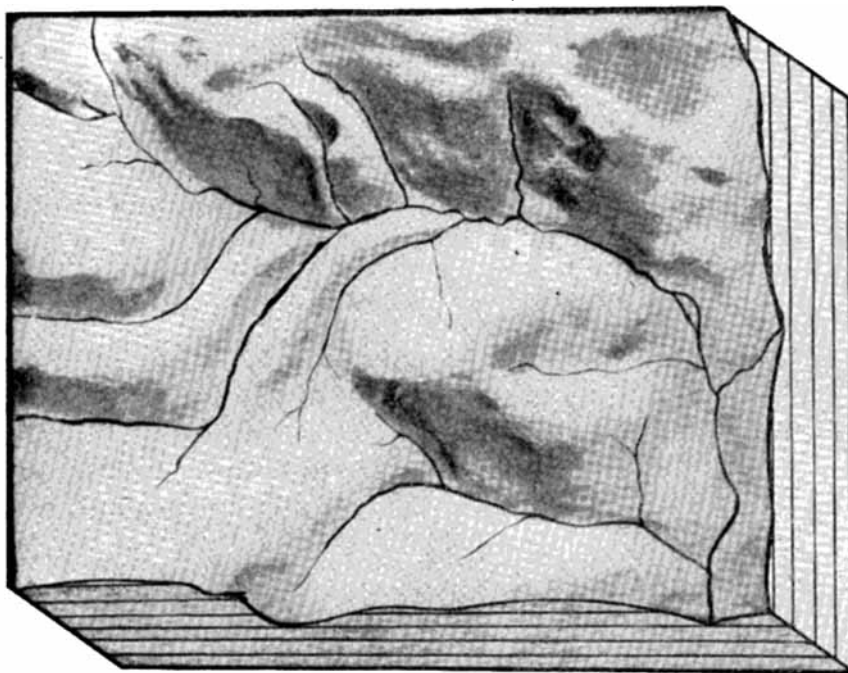


Fig. 3. Completed Model.

If it is desired to photograph the model for reproduction, this is best done by photographing merely the top surface, cutting this out and mounting it upon a base drawn in India ink, as shown in Fig. 3.

Miss Mary J. Booth of the Charleston, Ill., Normal School, the compiler of the valuable lists of geographic material which may be obtained free or at small cost, that have appeared from time to time in this Journal, has volunteered for Red Cross service in France and will soon leave this country if she has not already done so.