
Review: Map Projections

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SURVEYING.

'The Effects of Errors in Surveying.' By Henry Briggs, M.Sc., Honours Associate of the Royal School of Mines, etc. London: C. Griffin & Co., Ltd. 1912. Price 5s. net.

Although specially concerned with mine surveying, the matters here dealt with are by no means confined to that class of work, and, in fact, this book cannot fail to be of importance to all land surveyors who desire to do accurate work, and to learn under what conditions accuracy can best be assured.

The mathematical investigation of errors in surveying, their source, propagation, and effect in triangulation, traversing, and levelling is a subject which has in the past not received quite the attention in this country that it deserves; for while there are quite a large number of continental and American works dealing with the subject, those that have appeared here are comparatively few, for which reason the present publication should be specially welcome. After a brief introduction Mr. Briggs deals in the succeeding chapters with—II., The Analysis of Error; III., The Best Shape of Triangles; IV., The Propagation of Errors in Traversing; V., The Application of the Methods of Determining Average Error of Certain Problems in Traversing; VI., The Propagation of Error in Minor Triangulation; VII., Summary of Results. Then follows an Appendix giving a few useful tables. Much that is given by Mr. Briggs will doubtless be familiar to surveyors, but there is a considerable amount of originality shown in dealing with some of the investigations, and the results of these are given in a summary in Chapter VII., which will be useful for reference. Although the mean square error and the probable error are dealt with, and the familiar probability curve diagram given, it is the average error that is accepted as the criterion of a series of observations, and made the principal basis and subject of investigation throughout the book. The average error is defined as the arithmetic mean of the separate errors, or residuals, taken all with the same sign, either plus or minus. The following three reasons for deciding upon this choice are given by Mr. Briggs: first, that it is the standard of comparison most serviceable in a discussion of the relative accuracy of different results and processes; secondly, that it is more readily determined in practice than either of the other two forms; and thirdly, that it is more easily understood by those not well versed in the mathematical theory of errors. Whatever may be the general opinion as to this, it is certain that the book contains much valuable information that cannot fail to be of service to all engaged in accurate survey-work of any description. Levelling is not specially dealt with, and it might be well in another edition to give some pages to this subject.

MAP PROJECTIONS.

'Leitfaden der Kartenentwurfslehre von Prof. Dr. Karl Zöppritz.' In Dritter neu bearbeiteter und erweiterter Auflage, herausgegeben von Dr. Alois Bludau. Erster Teil: Die Projektionslehre. Mit 154 Figuren in Text und Zahlreichen Tabellen. Leipzig und Berlin: B. G. Teubner. 1912. Price 10m.

In 1883 Prof. Dr. Karl Zöppritz brought out the first edition of his 'Leitfaden der Kartenentwurfslehre,' an excellent work intended to meet the needs of universities and higher educational establishments. The author died two years after, and so it fell to the lot of Dr. Alois Bludau to prepare the second edition for publication. This, which appeared in 1899, owing to the numerous changes and additions, might almost have been considered an entirely new publication. That the work has been fully appreciated is evident from the fact that a third

edition has become necessary, and in the preparation of this Dr. Bludau has taken into consideration the more important map projections that have appeared in recent years, which he has described and illustrated by diagrams. Among these may be noted Van der Grinten's projection, accounts of which are given in *Petermanns Mitteilungen* for July, 1904, and the *Geographical Journal* for December, 1904, Craig's 'Retroazimuthal projection, described in his book on 'The Theory of Map Projections,' published at Cairo in 1910; and several others. Altogether this new edition of Part I. of the work, which is devoted almost entirely to map projections, contains much new information, and it has been increased from 178 to 264 pages, including several additional tables and a useful index.

SPEED MEASUREMENT.

'The Speed and Current Chronographer.' By Captain A. G. Noble, F.R.G.S., Extra Master, etc. Liverpool: Charles Birchall, Ltd. 1913.

This is a little pocket-book containing 376 pages of tables, which are divided into two parts. In Part I. each page gives in feet the distance a vessel will run in the time stated at head of the page at every quarter of a knot speed. In Part II. the distances are in miles and decimals of a mile.

These tables are, of course, primarily intended for facilitating accurate navigation, for which they should be of considerable service; but they can also be used by motorists and others for ascertaining speeds on land, in which case the knots can be readily converted into miles by referring to a table at the end of the book.

Captain Noble has furnished precise instructions, and any one wishing to make use of the tables will find little difficulty in doing so.

METEOROLOGY.

'Weather Science.' By R. G. K. Lempfert, M.A. London: T. C. & E. C. Jack. [1912.] Pp. vii. and 94. Price 6d.

This little volume is one of the numerous presentations of scientific knowledge on a more or less popular basis that have appeared of late. The work shows far more marks of originality than many similar productions, and the author has presented the expert knowledge of an official meteorologist in as clear a manner as the recondite nature of the subject will allow, merely assuming in his readers some acquaintance with the rudiments of physics. There is a chapter indicating the valuable results of recent upper-air researches by means of kites and balloons, and another touching upon the modern method of statistical correlation; but the most interesting and original part of the work is that discussing the convergence of air currents and other factors provoking rainfall in a cyclonic depression. The extremely rainy character of some of our east winds on the northern side of an ordinary eastward-moving depression is shown to be due to the fact that the easterly current, being cold and in itself relatively dry, has the effect of a mountain barrier upon the warmer moisture-laden south-westerly current on the southern side of the barometric minimum, forcing it to ascend and climb, as it were, over the shoulders of the dense surface current. The result of this process is, of course, specially rapid condensation and persistent heavy rain, which thus falls through the dry surface-wind from the east. To say that the easterly wind on such occasions is very wet is, of course, correct, but it is important to remember that the moisture really comes, as usual, from a south-westerly current off the Atlantic. On p. 34 we read the following with much satisfaction: "The picture represented by the isobars is undergoing continual