

three elements, such as D the magnetic declination, H the horizontal magnetic intensity, and Z the vertical intensity; but other specifications are equally valid, involving one or more of these three elements, together with a choice from the further four elements, X and Y the north and east horizontal components, F the total intensity, and I the magnetic inclination or dip. All these elements are represented in this volume (though not all to an equal extent) by charts, tables and graphs. They are based on more than 100,000 individual observations, relating to nearly 10,000 stations for D and 5,000 stations for the other elements.

There are sixty-three isomagnetic charts for 1945-0, namely, fifteen large-scale sectional diagrams on Mercator's projection, with two polar charts (northern and southern) for the elements D , H and Z , and three charts (one Mercator, covering the middle belt between latitudes 73° S. and 84° N., and two polar charts, north and south) for each of the other four elements.

The isoporic charts number eighty-four, namely, three each (two polar and one for the belt 73° S. to 84° W.) for each of the seven elements for each of the four epochs.

Only the middle-belt isomagnetic charts (for X , Y , F and I) and the middle-belt isoporic charts show the background of geographical outlines.

The unusually large scale of the isomagnetic 1945-0 charts for D , H and Z enables smaller anomalies to be shown than is usual on magnetic maps, at least over the oceans. But Vestine explicitly disavows any claim that the charts represent an accurate description of the field, because there are many regions which have never been magnetically surveyed, across which uncertain interpolations had to be made.

Values for 1945-0 of each of the seven elements, scaled from the charts at 5° intervals of latitude and longitude, and of their rates of secular change at each of the four epochs, scaled from the isoporic charts at 10° intervals of latitude and longitude, are given in tables, part of which are separately published².

The volume also includes 214 graphs showing the time variation of each element (separately for D , H and I , and in combination for X , Y , Z and F) for a hundred magnetic observatories, and a sample of eleven repeat stations (out of about two thousand for which such graphs were prepared in the course of the work). The positions of the observatories and of the survey and repeat stations are shown on supplementary charts.

This volume is unique in geomagnetic literature not only for the extent of the underlying data and the fullness of the reduction and representation of the data; it is the first to describe at all adequately the nature of the processes of reduction and representation, with examples of the actual working sheets of computations for a typical observing station. A useful improvement in the work has also been made by rendering the X and Y charts, and the D and H charts (both isomagnetic and isoporic), mutually consistent on the hypothesis of negligible electric currents crossing the earth's surface; and also by the use of simple analytic considerations on the form of the isomagnetic and isoporic lines near dip poles.

The volume is a worthy embodiment and memorial of the first quarter-century of the observing work of the Department of Terrestrial Magnetism; may this work be emulated and surpassed during the remainder of this twentieth century. The development of methods of aerial magnetic survey seems to hold

much promise for the future, though meanwhile well-tried methods should not be neglected.

¹ Carnegie Institution of Washington: Department of Terrestrial Magnetism. Publication 578: Description of the Earth's Main Magnetic Field and its Secular Change, 1905-1945. By E. H. Vestine, Lucille Laporte, Caroline Cooper, Isabelle Lange and W. C. Hendrix. Pp. v+532. (Washington, D.C.: Carnegie Institution, 1947.) 2.50 dollars.

² Carnegie Institution of Washington: Department of Terrestrial Magnetism. Final Values of Elements of the Geomagnetic Field at 5-Degree Intervals of Latitude and Longitude, Epoch 1945. By L. Laporte, C. Cooper, I. Lange, W. C. Hendrix and E. H. Vestine. Pp. 73. (Washington, D.C.: Carnegie Institution, 1946.) n.p.

OBITUARY

Prof. Ludwig Becker

PROF. LUDWIG WILHELM EMLI ERNST BECKER, for forty-two years occupant of the regius chair of astronomy in the University of Glasgow, died at Merano in Italy on November 11, 1947. Becker was born at Wesel in Germany in 1860 and educated at the University of Bonn where, in due course, he took his Ph.D. degree. In 1885, after two years as an assistant in the Berlin Observatory, he was recommended to the Earl of Crawford and Balcarres, who owned a large private observatory at Dun Echt, near Aberdeen, in professional charge, at the time, of Dr. R. Copeland. In the autumn of 1888 Lord Crawford presented the whole of his magnificent equipment, including his astronomical library of 15,000 volumes, to the Lords Commissioners of the Treasury for a new Royal Observatory. A site on Blackford Hill in Edinburgh was selected in 1889; Becker was included on the staff, with Copeland as Astronomer Royal. Four years later, Becker was appointed to the regius professorship of astronomy at Glasgow, occupying the chair until his retirement in 1935. The University Observatory half a century ago was well equipped for contemporary needs, and in his earlier years he extended considerably its instrumental resources.

Becker was an inspiring teacher. His 'honours-lectures' were mainly on celestial mechanics, of which he was a master. His scientific work covered a wide variety of subjects, of which the following may be mentioned: his investigation on the distribution of blue-violet light in the solar corona at the eclipse of August 30, 1905, in Tunisia; a long and careful investigation on the constant of aberration undertaken with the Glasgow transit circle; a capture-hypothesis relating to binary stars, in which he showed how such a system could capture a third star, losing in the process one of its own components, and how the hypothesis could account for the high eccentricities of binary star orbits (it may be added that this idea of capture has recently been adopted by Lyttleton in his earlier attempts to explain the formation of the planetary system); descriptions of various instrumental improvements such as a motor-micrometer for the transit circle and a new 'artificial horizon' for sextants.

Although Becker had become a naturalized British citizen before his appointment to Glasgow, this fact failed to save him from embarrassment and unmerited suspicion during the First World War; local public opinion forced his temporary retirement to Aviemore in the Highlands, where he lived in seclusion until the end of hostilities. Becker was one of the gentlest of men, modest and retiring in disposition and, whatever the outside world thought, respected and esteemed by his students both for his learning and his kindly qualities.

W. M. SMART