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Gravity Anomaly Map of Ireland

Sheet 5—South West

by

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Introduction. The earlier gravity work carried out in Ireland has been published in Memoir No. 2, Parts 2, 3 and 4. In 1954, a WORDEN gravimeter was acquired and the basis for a comprehensive survey of the country was laid down by the establishment of a network of base stations, the details of which are given in Bulletin No. 14. All subsequent gravity measurements have been taken with respect to this network and all the older stations are being reduced to the same basis.

In the investigations of various geophysical problems, it has been found that it is essential to evaluate the general gravity anomaly before beginning a detailed study. Thus, along with the special surveys, a complete coverage of the country is being attempted on a coarse grid of one station to every three kilometres.

As various areas of the country are completed, it is the intention to publish separate sheets showing the general gravity anomaly so that the results may be made available to other workers if required. Although these sheets will contain the results of the various special projects being investigated, the latter will be published separately when completed. Only a very general description is being given with this and subsequent sheets.

Measurements. In the area covered by this sheet, the value of the gravitational field has been determined at about 2300 stations, spaced approximately three kilometres apart in as even a distribution as the topography would allow. The measurements were taken with WORDEN gravimeter No. 211 which has been calibrated on the Macclesfield base line. The base stations used were those of the Irish network with a few additional interpolated ones.

All stations were located on roads or tracks. In 60% of the cases the heights were deduced from bench marks and in the remainder from spot heights. The measurements were reduced to mean sea level using a density of 2·67 grams per cubic centimetre for the BOUGUER correction.

The value for Normal Gravity was obtained from the 1930 International Gravity Formula.

No terrain correction, except for an inner circle of 100 metres diameter, has been applied and the stations were chosen so that any correction would be small.

Map. The basis for the map was obtained from a new map of Ireland of five sheets produced and published at the Ordnance Survey, Phœnix Park, Dublin. The scale of the map is 1 : 250,000 which is equivalent to 2·5 kilometres per centimetre or approximately four miles to one inch. The sheets of this map have a considerable overlap. In the future, as more data become available it is proposed to publish further sheets of the gravity map in similar form.

Brief Description of the Anomaly Field. The anomaly is, in general, positive with an average value of 8 mgals. This is the same as that for the half of Ireland south of the line from Dublin to Galway. The highest value measured was 36·2 mgals on the Dingle peninsula at (032 101)—National Grid coordinates are used throughout. Moreover, at the coast line nearly everywhere there is a steep gradient and here readings of 27 mgals are common. The lowest reading is −15·8 mgals at (097 085) a few miles south of Killarney.

The principal cause of the anomaly in the south of Ireland seems to arise from density differences in rocks older than the Devonian. This is not well brought out in the area of Sheet 5 because of the few places where these older rocks reach the surface.

The younger rocks, of Devonian and Carboniferous ages, have similar densities, namely about 2·70 g/cm^3 as given in Bulletin No. 4, and it is thus not surprising that only a few gravity features can be correlated with the surface rocks. One of the better defined of these features is the low trough running west-east from the point (148 068) to the point (206 076). This coincides with a syncline of Carboniferous limestone among the Devonian rocks. A similar syncline running east south east from Lismore (204 098) has an ill-defined gravity low associated with it. Again there are other synclines of the same limestone, such as the one through Cloyne (192 067), whose effect on the gravity anomaly is hardly detectable. It can be said, in general, that the anomaly over the Carboniferous is lower than over the Devonian in places where they can be compared e.g. in the form of syncline and anticline but the actual value of the anomaly depends principally on the rocks below both.

Within both the Carboniferous and the Devonian series of rocks no well defined density differences are noticeable on this scale. For example, the set of synclines and anticlines which have played such a large part in forming the much indented coastline of the south west of Ireland have very little effect on the gravity anomaly.

Large anomalies which are directly associated with other rocks are :—the high at (173 044) south east of Limerick which is produced by basic Vol-

canics in the Carboniferous and the highs at (177 124) and (193 158) which occur over Silurian anticlines. Similarly, there are a few smaller features which can be correlated with the surface rocks.

On the other hand there are numerous other features, large and small, which cannot be explained in terms of the visible rocks. Of these, and itself the most outstanding feature of the whole sheet, is the large area of negative anomaly south of Killarney. It is connected with another area of low anomaly which stretches north east from Cork. The latter becomes increasingly negative as it progresses eastwards. To the west north west of the Killarney anomaly, on the Dingle peninsula, the anomaly is positive and very high. Thus there must be a very steep gradient between the two areas, in Dingle Bay, but here the contours have not been drawn. This juxtaposition of high and low anomalies is known to occur elsewhere in Ireland, as well as in other countries, and both together form the subject of a separate study. From the smooth nature of the contours it can be said that the anomaly here is not related to the rock strata in the upper 10,000 ft. of the earth's crust.

Another, smaller, though remarkable feature occurs south of Mallow. To the south west at (150 096) the anomaly is low. This may be due, in part, to the lighter limestone but other deeper-sited rocks must be taken into account as the high values to the east at (162 097) indicate. The latter itself is quite outstanding.

The only remaining feature to which attention will be drawn is the high anomaly at (133 155), north of Askeaton. The strike of the feature and of the contours to the east are in contrast with the contour lines of the whole sheet. Here again deep-seated rock formations must be the cause.

THOMAS MURPHY

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1:250,000

IRELAND - SOUTH WEST

SHEET 5
(020 - 010)
1ST EDITION

1:250,000
1 cm. = 2·5 Km.
¼ Inch Approx. (precisely 0·253 inch) = 1 Mile.

5 0 5 10 15 20 25 30 35 Kilometres
5 0 5 10 15 20 25 Miles

Compiled Printed & Published by the Director
at the Ordnance Survey Office, Phœnix Park, Dublin. 1959.

On the East margin of this Sheet True North is 0° 14' W. of Grid North and on the West margin True North is 2° 04' E. of Grid North.

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