

AGGREGATE ANALYSIS.

By J. K. DIXON.

In making mechanical analyses of the soil the amounts of clay, silt, sand, &c., are determined without regard to the particles of crumb size which are evident in many soils on cultivation. These particles or aggregates are ground up to find out how much clay, &c., they contain. But they cannot be neglected, for their presence or absence may make all the difference between a good and poor soil for agricultural uses.

A method described by Buoyoucos (*Soil Science*, Vol. 40, p. 481, 1935) was therefore applied in the Soil Laboratory at the Cawthron Institute, in order to find out the proportion of aggregates of different sizes in a number of New Zealand soils. A striking example of the difference in structure between two soils which on mechanical analysis appeared similar is the case of the basalt soil and clay-stone soil of North Auckland. The former is a clay, but an aggregate analysis showed that it contained 25 per cent. of particles greater than $\frac{1}{16}$ in. in diameter, whereas the latter, a clay loam, contained only 2 per cent. of particles greater than $\frac{1}{16}$ in. in diameter. The basalt soil, although a clay, therefore gives a much better tilth than the claystone soil, owing to the presence of so many more aggregates.

The detailed results of this work will be published elsewhere.

RADIO RESEARCH.

Advisory Committee: Professor James Shelley (Chairman), Professors P. W. Burbidge (Auckland), D. C. H. Florance (Wellington), R. Jack (Dunedin), F. W. G. White (Christchurch), Squadron-Leader E. M. F. Grundy (Air Department), Captain G. H. Heal, N.Z.S.C., Army Headquarters, Messrs. E. H. R. Green (Post and Telegraph Department), J. R. Smith (National Broadcasting Service), and Dr. M. A. F. Barnett (Department of Scientific and Industrial Research).

During the year a Radio Research Committee was set up with the following objectives:—

- (a) To co-ordinate the radio-research activities of the Broadcasting, Post and Telegraph, Defence, and Aviation Services and of the several University Colleges.
- (b) To establish liaison with the radio-research organizations in other parts of the Empire, notably with the Australian Radio Research Board, so that research in the Southern Hemisphere may be carried out in the most profitable way.
- (c) To promote the development of radio research in New Zealand in its scientific aspects and with special reference to local geographical and meteorological factors in this country.

The first meeting of the Committee was held on the 28th May, 1937, when it was decided to confine the research work, in the first place, along three main lines. These will be treated in turn below, although it is too soon to be able to report in any detail on the results obtained.

(1) *Ionospheric Investigations.*—The ionosphere, or ionized region of the upper atmosphere, plays a predominant part in the propagation of wireless waves over any considerable distance, and work on this subject takes a leading place in radio-research investigations all over the world. The effects vary in different places, and there is at present a serious lack of information relating to the Southern Hemisphere. Active research work on different aspects of this problem has been started both at Canterbury College under the supervision of Professor White, and at Victoria College under Professor Florance. A full-time assistant, Mr. C. J. Banwell, has been appointed at Christchurch and a part-time worker at Wellington. Following the practice in other countries, automatic equipment is being obtained by means of which more or less continuous records can be obtained of changes in the ionosphere at one place, at least, in New Zealand. Such changes are closely related with solar activity, magnetic storms and aurorae, and the sub-committee concerned is keeping closely in touch with work being carried out in New Zealand in these allied fields.

(2) *Research on the Reception of Distant Signals.*—Measurements of the variations of intensity, the direction of arrival and elevation, and the polarization of incoming short-wave signals from overseas are of considerable importance to New Zealand, whether looked at from the purely scientific point of view or from the more practical aspect of, for instance, the best location and arrangement of aerials for receiving or transmitting short-wave signals from or to England. Such work is of particular interest because New Zealand is so near the antipodes of England. It is perhaps worth mentioning, for instance, that the shortest route for radio waves from Auckland to London passes almost over the North Pole, while from Dunedin it passes near Panama.

A start has been made on some preliminary measurements at Auckland, where a part-time worker has been appointed under Professor Burbidge. To develop this research fully, however, requires the construction and use of apparatus involving a highly specialized technique, and the Committee is at present endeavouring to find a man whose qualifications would enable him to take charge of the work and bring it to a successful conclusion. It should be mentioned that the British Radio Research Board has asked the Department to undertake this type of investigation and has offered to co-operate by arranging for special transmissions.

(3) *Research in connection with the Propagation of Waves over the Earth.*—This work, which involves the measurement of the attenuation of local signals as the distance from the transmitter is increased, is a problem of direct interest in the technical development of radio broadcasting. The actual