Research news and notes

GEOPHYSICS AT THE VICTORIA UNIVERSITY OF WELLINGTON

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1. Introduction

New Zealand's first chair of geophysics was inaugurated at Victoria University of Wellington in 1967. This established geophysics - the quantitative study of the earth's physical properties and processes - as a major specialisation in the University, although research and teaching in several branches of the subject had already been in progress for many years. In the Department of Physics, geophysics has been one of the principal research interests since the mid 1950's; in the Department of Geology a lectureship in applied geophysics was set up in 1965; and in the Department of Mathematics research on geothermal systems has been carried out, and more recently another important branch of geophysics was introduced with the establishment in 1968 of a senior lectureship in meteorology.

These developments reflect the broad relevance of geophysics to New Zealand as a country which is affected by earthquakes and volcanic activity, where a special contribution can be made to the study of global phenomena such as geomagnetism, where studies of the atmosphere and oceans are important to many aspects of life, and where economic development demands not only a persistent research for minerals but the construction of many power stations and other large structures requiring intensive site investigation.

2. Courses

The study of geophysics demands a prior knowledge of mathematics and physics. At Victoria the topics of gravity and terrestrial heat are introduced as part of the second-year and third-year physics courses respectively, and geophysical exploration is offered, chiefly for geology majors, as a half-unit at the third-year level.

At the Honours level courses are given on the physics of the earth's interior, atmospheric physics, geophysical exploration and dynamical meteorology. It is proposed in the near future to consolidate these courses, together with some additions, into a degree of honours in geophysics, with the emphasis on either the solid earth or the fluid envelope, according to a student's interests and objectives.

3. Research

Research facilities are available in the following fields of geophysics:-

Solid earth:	earthquake seismology, experimental seismology, volcano physics, thermal geophysics, geophysical exploration, rock magnetism, geomagnetic sounding, experimental studies at elevated temperature and pressure, earth tides.

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Ocean: magnetic sounding, seismic sounding, hydrology.

Atmosphere: ionospheric studies using satellite radio transmissions, geomagnetic micropulsations, meteorology.

Ten members of the academic staff are engaged on geophysical research. Six doctoral candidates and one master's candidate are at present working on geophysical theses. Several honours students each year carry out geophysical projects.

It is a great advantage to geophysical research at the University that the main government institutions concerned with geophysics are situated in the Wellington area: Geophysics Division, Physics and Engineering Laboratory, and N.Z. Oceanographic Institute, all of D.S.I.R.; and the N.Z. Meteorological Service.

A series of geophysics seminars is held each year at the University by joint arrangement with Geophysics Division, D.S.I.R.

4. Relevance to Earthquake Engineering

The broad programme of research and teaching outlined above includes several fields of direct or potential interest to earthquake engineers. Of these the most obvious is earthquake seismology itself, especially since the emphasis is on the earthquake as a phenomenon rather than on the more traditional study of the earth's deep structure as revealed by earthquake waves.

Of comparable significance is the geophysical study of the earth's near surface layers, particularly the static and dynamic properties that enter into foundation engineering. Here the methods of geophysical exploration are of great value.

The research programme in experimental seismology has the object of extending the study of seismic propagation in shallow strata beyond what is achieved in the standard methods of seismic survey. For this purpose a pulsed vibrator is used as a controlled source of seismic waves in the ground, thus permitting detailed investigations of amplitude and frequency effects. Being moreover an effective source of compressional, shear and dispersive waves, the vibrator offers a technique for studying the elastic moduli of rocks in situ.

These facilities offer good scope for postgraduate research by suitably qualified students with an interest in earthquake engineering, especially in some of the outstanding problems of foundation engineering.