SHORTER CONTRIBUTION

Gravitational effects on ground-water level

Preliminary report

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Ground-water investigations recently carried out by the Department of Land Improvement and Drainage, Royal Institute of Technology, Stockholm, have clearly shown that there exists a gravitational effect on the fluctuations of ground-water level in Archaean bedrock in Central Sweden.

Measurements from two wells are here reported to illustrate the results obtained. Well A is situated at Skoby, about 40 km NE of Uppsala (see Fig. 1), and drilled to a depth of 70 m directly in the bedrock. Well B is situated about 25 km N of Stockholm and has a depth of 110 m in the bedrock. The distance of the wells from the Baltic Sea is too great to make a direct tidal effect possible from there.

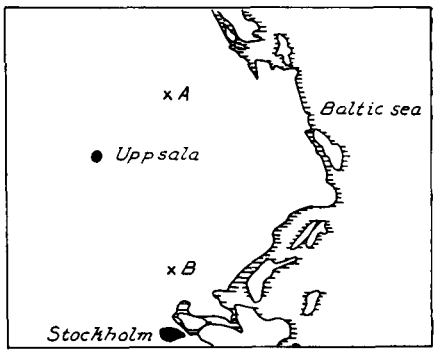

FIG. 1. The map shows the location of the examined wells at Skoby (*A*) and Vallentuna (*B*) in Central Sweden.

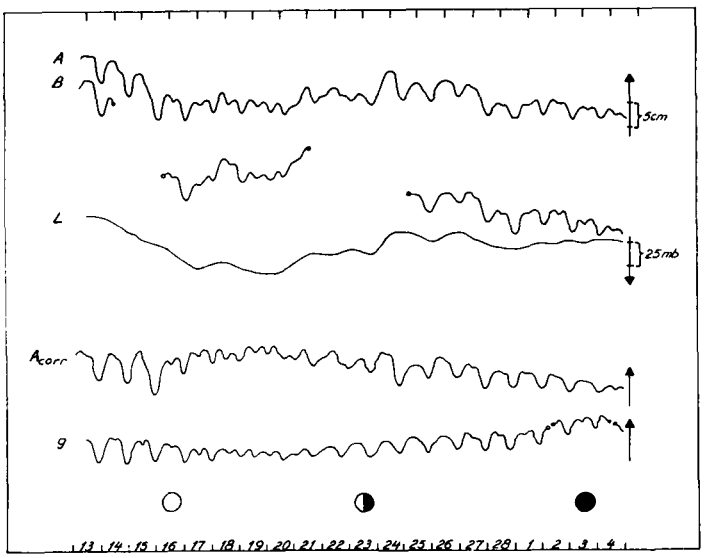

FIG. 2. Registrations during the period 13.2.65–4.3.65 of the ground-water levels in the Skoby and Vallentuna wells (*A*, *B*), atmospheric pressure (*L*) and gravity (*g*). A_{corr} shows ground-water level in Skoby well after adjustment to constant atmospheric pressure.

Fluctuations in the water level have been registered continually in both wells by means of a self-recording float device. Results for a three-week period (13/2–4/3 1965) are shown in Fig. 2 (the recording for well B has been chopped in two places because of interferences due to pumping in a nearby well). The recording from well A has been corrected for variations in atmospheric pressure (curve L) and is reported as curve A_{corr} in Fig. 2.

The relation between ground-water level and the force of gravity is obtained by comparing curve A_{corr} and curve g, a recording obtained from the gravimeter in use at the Department of Geodesy at the Institute of Technology in Stockholm. Correspondence in the general trend of these two curves is as seen quite clear.

Similar water level variations have earlier been reported from various parts of the world. The phenomenon is a result of periodic movements in the earth's crust primarily as a result of the moon's and secondarily the sun's changing attraction for the earth. When the attraction force increases (g decreases) the pressure on the earth's crust is reduced and the water level in the wells is lowered. The manner in which gravity g and thereby the water level fluctuates with the different phases of the moon is apparent from the figure.

A more detailed report and analysis of the results will be presented in a later publication.

BOOK REVIEW

Solid-Earth Geophysics: Survey and Outlook. Publication 1231, National Academy of Sciences—National Research Council, Washington, D.C., 1964. Price $4.00 (198 pp.).

During the last few years there has been a considerable increase in interest in solid-Earth geophysics. Perhaps this may be attributed to the stimulus given by the Upper Mantle Project, by the underground nuclear detection programme, and by recent discoveries in geophysical oceanography and palaeomagnetism.

This book shows the increased interest and activity in the United States. It is the outcome of a three-year study on the future of solid-Earth geophysics in the United States by a Panel of well known experts appointed by the National Academy of Sciences. It reviews the problems of solid-Earth geophysics as seen by the members of the Panel and recommends the action needed to tackle these problems. The main recommendation is that the annual national expenditure on the subject should be increased to nearly three times the present figure over the next ten years. The recommended increase applies to all parts of the subject, but it is worth mentioning that large increases in the size of University geophysics departments are advocated. It is also suggested that a programme of deep drilling of the continental crust (3–8 km depth) should be initiated.

The book is divided into three sections. Section I introduces the problems and summarizes the recommendations. Section II, which forms the main bulk of the book, provides a most valuable outline of the problems and opportunities, subject by subject (covering seismology, gravity and geodesy, Earth tides and tilt, geomagnetism, heat flow, isotope geochemistry, geochemistry and petrology, physical properties of rocks and minerals, related problems in geology, theoretical geophysics, deep drilling, integrated regional studies, and special laboratories). Section III is devoted to manpower and institutions.

The book provides an example of the philosophy of attack on a broad front. There can be little doubt that many geophysical problems yield best to such an attack. Nevertheless, there is still room for carefully planned experiments and observations on a less ambitious financial scale.

M. H. P. Bott

CORRIGENDUM

Tellus volume 17, number 1 in Y. TOBA's paper *"On the giant sea-salt particles in the atmosphere. 1. General Features of the Distribution"* the text to figure 10 should be replaced by the text to figure 12, and vice-versa.