EXPLORATION OF VOLCANIC GEOTHERMAL ENERGY
RESOURCES BASED ON RHEOLOGICAL TECHNIQUES

Fourth Technical Status Report

Gunnar Bodvarsson

School of Oceanography
Oregon State University
Corvallis, Oregon 97331

MASTER

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Brief Statement of Objectives

Elementary considerations indicate that rheological methods may be useful in the detection and delineation of volcanic geothermal resources, in particular, those connected with subsurface molten or quasi-molten plutons such as may possibly be the case in the Oregon-Washington Cascades. The processes of main interest are the deformations or flows caused by (1) seasonal snow-ice load, (2) tidal strain and (3) seismic surface waves from moderate to high energy earthquakes. We propose to carry out an initial physical-analytic and field study of the general applicability of the rheidity sensing techniques in the Oregon-Washington Cascade region.

Personnel

Gunnar Bodvarsson and Ansel Johnson devoted each 3 months at 1/6 time to the project without pay. Cindy Veen devoted 3 months at 1/2 time and 50% of her efforts were paid by the project.

Progress Summary

(1) Two tilt-meters have been operated at a site on the Oregon Institute of Technology campus at Klamath Falls, Oregon, since February 13th. One strain-meter was installed at the same site on March 11th and the second on March 22nd. All four instruments have been tested and calibrated and are now fully operational. There have been no major problems except that the first temperature recorders were not sensitive enough and two new instruments have therefore been ordered.

(2) Both tilt and strain records obtained so far display semi-diurnal and diurnal oscillations that have the characteristics of solid earth tidal strain fields. Considering the small forcing fields, the records appear to be of a satisfactory quality.

(3) The records evidently contain thermal and possibly barometric noise that has to be removed. We have initiated numerical data processing for the purpose of suppressing the noise and to obtain numerical values for the amplitude and phases of the signals of primary interest. This work is now in progress.

Plans for period April 1st to June 30th, 1979

(4) Plan to install one tilt and one strain system away from the fault system at the OIT campus for background data. Field tests at Klamath Falls are then to be completed.

(5) Equipment to be moved to the Newberry Caldera and possibly other fault sites.

(6) Data processing technique to be further developed and refined.