SCIENCE

Earth Sciences

The meteorological data collected near the Marshall Islands during Operation Crossroads in 1946 led Professor Palmer and his co-workers to hope that changes in atmospheric motion and composition which usually go undetected in the sparse observing network normally maintained in the tropics could be analyzed, described, and understood. These hopes are being justified. It has been shown that the conventional ideas of atmospheric circulation in the subequatorial zone are unrealistic. The equatorial circulation is dominated by a broad easterly current overlapping the surface low-pressure trough, and this current is the vehicle of a long train of atmospheric waves moving westward, which extend over the breadth of the tropical Pacific Ocean and grow in amplitude until they finally break into vortices that stagnate seasonally over Australia or southeastern Asia to form a "monsoon low." A certain small proportion of these vortices intensify rapidly and become typhoons. Understanding of basic atmospheric processes, obtained through intensive study of abundant observational data applying to selected time sequences, may well lead to improvements in techniques of weather prediction in other regions.

During the past two years observations of the periodic tidal fluctuations of gravity, throughout periods of several weeks to several months, have been made at UCLA, Pasadena, Honolulu, Attu, and Lake Tahoe. In the Los Angeles area, a major feature of the earth's response is a phase lag of about 80 minutes. The amplitude of the gravity fluctuations is about 132 per cent of that theoretically expected on a rigid earth—a result in general accord with observations of others. An interesting regional difference in the earth tides is found in the failure of the Honolulu results to exhibit the simple correlation with the primary excitation forces, clearly revealed at the Southern California stations. Regional variations in the earth's response to the tide-producing forces will be investigated.

The plastic behavior of marble under high confining pressures has been known through laboratory studies for about fifty years. Quantitative explanations of the processes that accompany and permit large strains in solids have, however, been unsatisfactory or lacking. Recent work by Griggs, Turner, and Handin furnishes an understanding of the major processes involved in the deformation of Yule marble. Literally, the deformations may be both seen and understood, since the petrographic microscope, and the transparency of thin sections of marble, are essential features in the success of the study. Microscopic observations of the statistics of the orientations of the calcite crystals composing the marble aggregate, first in the natural state, and then after deformation by known stresses, furnished the detailed evidence which required explanation. Two major processes contribute to the yielding of an individual crystal in the aggregate—crystallographic "twinning" on the susceptible $\{01\bar{1}2\}$ plane, and translation on this same plane. Analytic treatment of these processes has resulted in correlation of the anisotropic plasticity of the aggregate (as experimentally observed under compression and extension in the test laboratory) and its initial statistical crystal orientation. Increased temperature and the addition of water reduce the strength of marble markedly without apparently altering the mechanism of deformation. This program, designed to further understanding of deformation in the earth's crust, is also adding to knowledge of the plastic behavior of crystalline solids in general.

LOUIS B. SLICHTER

Institute of Geophysics
University of California
Los Angeles

SCIENCE, founded in 1880, is published each Friday by the American Association for the Advancement of Science at the Business Press, 10 McGovern Ave., Lancaster, Pa. Entered as second-class matter at the Post Office at Lancaster, Pa., January 13, 1948, under the Act of March 3, 1879. Acceptance for mailing at the special rate postage provided for in the Act of February 28, 1925, embodied in Paragraph (d-2) Section 34.40 P. L. & R. of 1948.

All correspondence should be sent to SCIENCE, 1515 Massachusetts Ave., N.W., Washington 5, D. C. The AAAS assumes no responsibility for the safety of manuscripts or for the opinions expressed by contributors. Four weeks' notice is required for change of address, and an address stencil label from a recent issue must be furnished. Claims for a missing number will be allowed only if received within 60 days from date of issue.

Annual subscriptions, $7.50; single copies, $.25; foreign postage, outside the Pan-American Union, $1.00; Canadian postage, $.50. Special rates to members of the AAAS.

The AAAS also publishes THE SCIENTIFIC MONTHLY. Subscription rates on request.