Global Plate Motion and the Obliquity of the Earth. The concept of global tectonic plate movement explains many geophysical and geological phenomena in a surprisingly simple way. It has been proposed that such movement may provide important clues to the understanding of secular changes in the earth's obliquity. In the present paper we discuss precession and nutation including the effects of slow changes in the shape of the earth due to plate motion with special reference to secular variations in the obliquity of the ecliptic. We begin the investigation with the redistribution of mass along the world-encircling system of oceanic ridges and trenches resulting from the relative motions of the tectonic plates. In the derivation of the equation of motion, we follow Darwin's footsteps by using a set of rectangular axes which move with reference to the earth. In order to obtain a full comprehension of the physical meaning of the complex formula, computer programs are developed to follow the evolution of the moments of inertia of the earth due to plate motion. Accordingly, the N-plate problem of plate tectonics forms the system from which the requisite numerical data are taken. The result of our computations shows that the change in the obliquity of ecliptic of the earth due to plate motion since Cenozoic time is about $3'' \times 10^{-3}$.

T90
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PLATE TECTONICS II (T)

Park Ballroom *Thursday 1315h*

Chairmen: MARC SBAR (Lamont-Doherty Geological Observatory)
and MUAWIA BARAZANGI (Cornell University)

A brief business meeting of the Section will precede the scientific session.

All papers will begin at 12 minute intervals.

About air and space photo interpretations of Afar. The actual tectonic significance of the Afar depression, its desertic climate, and its somewhat forbidding physiography have recently induced several earth-scientists to restrict their geological work on this area to more or less wide air- and (or) space photography interpretations. Also the present authors and their collaborators have been confronted, during the extensive field- and lab- work they are carrying since 1967 in the Afar depression, with the danger of air photo misinterpretation, and only careful field investigations have prevented them from committing a certain quantity of errors. Unfortunately, some other scientists have published both papers and maps overwhelmingly based upon air-and (or) space photogeological interpretation with no, or not enough, ground testing. The consequent errors proved to be sometimes quite heavy indeed. It is therefore necessary to draw attention both on these misinterpretations and on the necessity to use this marvellous tool with sufficient ground checking. Some of these errors are reviewed in this paper. Unexpected local development of soil or vegetation has been taken for geological formations. Straight geographical features, such as river beds, laval flows or windchiselled structures, have been interpreted as tectonic faults.

T91
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Stationary Africa, Moving Eurasia. The Walvis ridge stretches from Africa to Tristan and Gough where it stops abruptly on ocean floor formed about 25 my ago. Concentric South Atlantic aseismic ridges also end close to the 25 my isochron. Mauritius and Reunion lie at the end of an aseismic ridge concentric with the Walvis and are separated from the Mid-Indian Ocean ridge by sea floor 25 my old and younger. We interpret these observations to mean that the African plate came to rest over underlying plumes about 25 my ago. Palaeomagnetic results indicate that Africa has not moved with respect to the main dipole field since that time. A surge in volcanism within the African plate during the last 25 my has accompanied the development of the distinctive basin, swell and rift structure of the continent which we relate to the standstill. Because Africa came to rest at the start of the volcanic surge few of its young volcanoes lie at the end of plume traces. Lengths and trends of plume traces on other plates for the last 25 my can be predicted assuming all plumes fixed with respect to each other and Africa stationary over plumes. Three oceanic and 3 continental plume traces on the Eurasian plate are roughly concentric and lie close to predicted paths. During the last 25 my the North Atlantic ridge has generally moved westward off axial plumes but close to Iceland and the Azores it has jumped back to lie over plumes.

T92
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W.S.F. Kidd
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The Nature of "Transform Faults" in Iceland. The crest of the Mid-Atlantic Ridge is offset some 150 kilometers right laterally in South Iceland and similar left lateral offset is observed near the north coast of Iceland. However, this offset is very gradual in that the two volcanic zones in South Iceland that represent the ridge crests run parallel over a distance of some 150 kilometers. The transfer of tensile deformation from one volcanic zone to the other is thus distributed over an area and no principal transform fault has been recognized. Faults that have been observed to be active in major earthquakes in South Iceland in recent times strike approximately perpendicular to the predicted direction of a transform fault. Right lateral displacement is indicated on these faults. The condition off the coast of North Iceland seem to be similar, with the transfer of deformation taking place over a distance of approximately 100 kilometers measured parallel to the ridge crest. Thus there are no transform faults in Iceland, but rather large areas of shear deformation transfer the tensile deformation from one segment of the ridge crest to another.

T93
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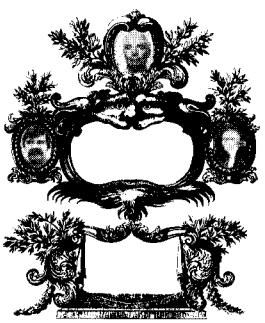

Cover AGU award winners for 1973: top, Fleming Medalist Victor Vacquier; left, Macelwane Award Winner R. Allan Freeze; right, Bowie Medalist George P. Woollard.

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