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MEMORANDUM FOR: Malcolm R. Knapp, Chief
WMGT

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FROM: Philip S. Justus, Section Leader
Geology-Geophysics Section
WMGT

A.K. Ibrahim, Project Manager
Geology-Geophysics Section
WMGT

SUBJECT: TRIP REPORT, AMERICAN GEOPHYSICAL UNION (AGU) MEETING, MAY 22 - 31, 1985

Dr. Ibrahim and Dr. Justus attended the AGU annual meeting in Baltimore, Maryland. The meeting consisted of oral presentations and poster presentations. There were several sessions held every day of the meeting covering hydrology, seismology, tectonophysics, volcanology, geochemistry, and petrology that are relevant to WMGT.

Most of the talks that Dr. Ibrahim attended were related to seismology and geophysics. The theme of these talks concentrated on the global networks and the Incorporated Research Institute for Seismology program, the use of reflection data from different programs to identify the Moho and the different plate boundaries, focal mechanism studies, stress measurements and earthquake induced seismicity.

Some of the talks, which were of interest to the Division, dealt with a new processing technique which enhanced the signal to noise ratio on the reflection sections. This technique can be applied to some of the data collected at BWIP. Dr. Ibrahim raised this idea with the manager at BWIP and we hope some action can be taken. Another topic was the size of the earthquake which can be generated on the subduction zone in the NW of the USA. The size of this earthquake may control the peak ground acceleration for which the BWIP will be designed. Also, induced seismicity was of interest, since oil production in the vicinity of the salt sites may generate microearthquakes which may have some effects on the repository.

A short summary of other selected papers are attached.

Dr. Justus, on occasion accompanied by Dr. Ibrahim, conducted eight interviews that were pre-arranged through the AGU employment service. Both of us also had the opportunity to discuss our needs at NMSS with a representative from MITRE Corporation.

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Attending the AGU meeting gave us the opportunity to exchange ideas and discuss future work needs in the Division with colleagues and keep abreast of new developments and advancements in the earth sciences field.

/S/

Philip S. Justus, Section Leader
Geology-Geophysics Section WMGT

/S/

A.K. Ibrahim, Project Manager
Geology-Geophysics Section WMGT

Enclosure:
Trip Report
to AGU Meeting

OFC	WMGT	WMGT				
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DATE	85/07/24	85/07/24				

- Tectonic of Slow Spreading mid-Ocean Ridge and Consequences of a Variable Depth to Brittle/Ductile Transition, By G.D. Harper

Indicated that magma chamber episodically freezes beneath slow-spreading ridges. Example of these ridges are the mid-Atlantic and Gorda Ridges. Freezing of the magma chamber has important tectonique consequences such as fault locking. The topographic effect of fault locking will be causing a change in the width of the inner floor. The deep microearthquakes at these slow spreading centers indicate that the faults extend into the upper mantle.

- Heterogenities in Strength Along Mid-Oceainc Ridge Normal Faults, By S. C. Solomon, et. al.

A network of seismic station was deployed in the mid-Atlantic Ridge to record microearthquakes, to resolve their focal depths and determine source parameters from telseismic events. The focal depths of the microearthquakes were at 5.8 Km. It is suggested by the authors that the microearthquakes outlined a strong portion of the crust and that large earthquakes initiate near the base of the crust and propagate upwards to the sea floor. Another possibility is that the microearthquakes at 5-8 Km depth may mark the strongest portion of the median valley faults and the strong zone may act as a barrier to the downward propagation of the fault slip during large earthquakes.

- Broad-based and Short-period Body Wave-form Inversion for Source Characterization of Ridge Crust Earthquakes, By E.A. Bergman, et.al.

They used short period P waveforms to supplement long period P and SH wave form data to improve depth resolution and provide uniformity about source complexity which can not be resolved with long period data alone. They suggested that if only broad based data are used, the focal depth is usually shallower than that estimated from a single point source.

- The Structure of Young Oceanic Crust Near a Fast Spreading Ridge, By J.S. McClaire.

A split refraction profile was shot near the East Pacific Rise. The data was synthesized using the WKB approach. The modeling of the data showed an unusual thin crust. They found that the older the crust the higher the velocity. They also indicated the existence of a low velocity layer sandwiched between layers of high velocity in the upper crust. This layer is present near fast spreading ridges over much of the world's ocean.

o Preliminary Results on Thickness of Benioff Zone in the San Juan Province of Argentina from Digital Local Network Data, By R.F. Smelley, et. al.

The purpose of this study was to study the physical properties of the Benioff zone and the overlying South American lithosphere. Using 50 events located beneath the seismic network, they suggested that the seismogenic zone of the subducted plate is restricted to a narrow depth range of about 20 Km centered about 100 Km depth.

o A Double Planed Seismic Zone at Cape Mendocino, By S.W. Smith

The Benioff zone at Cape Mendocino is formed of a double zone. Each of these zones is very thin about 5 Km with a quiescent zone in between ranging in thickness from 2-3 Km in width. It is suggested that the upper slab is the result of a remnant oceanic crust which existed 5 million years ago, while the lower zone represents the present day subducted slab.

o Investigation of the Lower Crust in the Rhinegraben by Unified Geophysical Experiments and the Dynamics of the Rifting Process, By K. Fuch, et. al.

Near vertical and wide angle seismic reflections are used to identify the structure of the Rhinegraben. The authors found that the lower crust subsided into the graben proper by the same amount on the top of the basement. One observation they noted is that the 2-7 Km crystalline crust in the Black Forest is associated with seismic activities at a depth of 20 Km.

o Crustal Blocks of the Applachian Region and the Eastern Limit to the Applachian Detachment, By R.D. Hatcher, et. al.

Using gravity-magnetic signature, the authors tried to subdivide the crust beneath the Appalachian region into several blocks with different sizes. The layer blocks represent inhereted features from the Grenville event, while smaller blocks probably represent accreted terrains caused by thermal or mechanical history. They also indicated that the blue ridge bounday extends to the east more than was proposed before.

o New COCORP Profiling in the Southeastern U.S. Coastal Plain, By J.H. McBride, et. al.

582 Km of deep seismic reflection data were collected between northern Florida into the Piedmont of west central Georgia. A major dipping basin 50 Km wide zone was identified. It was suggested that this feature marks the late Paleozoic suture between N. America and Africa. At the north end of the

seismic reflection line, a prominent reflection identified in the upper crust may represent the southern Appalachian detachment. They indicated that the crust has a roughly uniform thickness of about 33-36 Km.

o Location and Character of the Later Paleozpic Suture Beneath the Southeastern U.S. Coastal Plain. Evidence from new COCORP Profiling, By S.A. Arnow, et.al.

Seismic reflection data collected in West-central Georgia reveal the existence of a dipping complex zone that probably corresponds to the late Paleozoic suture between N. America and Africa. The zone is found to coincide with Brunswick magnetic anomaly and may extend off-shore paralleling the trend of the east coast magntic anomaly.

o Vertical Seismic Profiling Related to Deep Scientific Drilling, By S.B. Smithson, et.al.

The authors outlined the advantage of vertical seismic profiling such as:

1. Calibration of surface seismic lines
2. Identification of multiples on seismic lines
3. Recognition of fractures and presence of fluid
4. Velocity determination
5. Identification of dipping interfaces
6. Estimation of Attenuation

o In-Situ Stress Measurement in a 1 KM Deep Well Near the Ramapo Fault Zone, By M.D. Zoback et al

A 2 km deep hole was drilled in the Triassic formation in the vicinity of the Ramapo fault zone. Hydraulic fracturing stress measurements and seismic measurements were made. The direction of the maximum horizontal compression measured is about NSSE. These results are consistent with the result of recent focal mechanism studies on near by microearthquakes. Since the direction of the maximum horizontal compression is parallel to the strike of the Ramapo fault zone, it was concluded that the Ramapo fault is unlikely to be a seismogenic structure.

o Induced Seismicity at Kariba Reservoir - A Re-Examination, By D. Simpson

25 years of seismic measurement were correlated with the water level at the Kariba reservoir. The largest earthquake in 1963 followed when the water level in the reservoir reached its maximum and the rate of

seismicity for the next three years was correlated with changes in the water level.

o Incorporated Research Institute for Seismology (IRIS) Symposium

Planning for a new global seismographic network was discussed. A draft for the design goals was distributed for comments to seismologists in the United States and abroad. The design goals describe the instruments and the format in which the data will be collected. A discussion about the dynamic range, the band width and density of the stations was discussed. It was suggested that modern seismological investigations require a broadband response. Long period surface waves have been used to map lateral heterogeneities in the mantle and to determine seismic source parameters. Also the distribution of the seismic network around the globe was discussed. A presentation about design optimal planning for the network was given; and a figure showing the distribution of the station was shown.

o Seismic Imaging in Long Valley, California, By J.R. Rundle et al

A major project to explore the crust beneath the Long Valley area in California was initiated by a consortium from different universities. Reflection data collected were analysed using state-of-the-art technique in processing. Tracing of the outcrop on the surface to about 5 Km depth was well defined on the reflection section. Also a well defined reflector around 10 sec was identified as the Moho under the Long Valley.