(2) altering brown goethite and amorphous ferric oxide in mud to hematite pigment in mudstone; and (3) oxidizing inherited magnetite to specular hematite, and altering iron-bearing silicates which supplied some of the hematitic pigment.

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FLUORESCENT TRACER STUDY OF EOLIAN SAND TRANSPORT[1]

Ten pounds of eolian sand were dyed fluorescent red and released on the crest of a large shadow dune at Windy Point, San Gorgonio Pass, California. The dune surface was sampled by pressing 3×3-in. Vaseline-coated cards onto the sands at predetermined stations downwind of the tracer point source. Westerly winds blew at 15–25 m.p.h. during the test.

Sample cards were examined under ultraviolet light and the number of fluorescent grains per square inch determined for elapsed times of 3, 20, and 60 min. after tracer release. Isopleths of equal tracer concentration at the three elapsed times all delineated lobate patterns presumably in response to variable wind "streamlines" over the dune.

At 2.5 hrs. after tracer release a lag deposit of very coarse fluorescent grains remained at the point source. The lag grains formed ripples with lengths three times those of the natural ripples. This suggests that ripple length is governed primarily by grain diameter and wind velocity.

Analysis of tracer distribution revealed that fluorescent sand entered and left the sample grid at a constant rate. A decay curve of tracer loss from the point source indicated extinction of the point source occurred 157 min. after release. Difference between decay value and per cent of the total tracer on the dune at any moment was equivalent to per cent of tracer loss from the sample grid at any moment. Knowing the distance of grain movement, this relationship yielded an average tracer grain velocity of 30.36 in./min. Time-lapse motion pictures established that creep velocity, assumed to be equivalent to ripple velocity, was 0.153 in./min., indicating that grains in saltation were traveling roughly 198 times faster than grains in creep. This magnitude of difference between creep and saltation velocity is physically inconsistent with Bagnold's classic division of eolian sand load.

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GEOLOGY AND PALEONTOLOGY OF A PORTION OF MANIX BASIN DEPOSITS, SAN BERNARDINO COUNTY, CALIFORNIA

Late Pleistocene fluviatile and lacustrine deposits in the Manix Lake basin occupy about 250 sq. mi. of the Mojave Desert including Coyote Lake and Troy Lake. The sediments have been exposed by recent downcutting of the Mojave River along part of the margin of the basin.

The lowest sediments are conglomerates that lie unconformably on metamorphic and volcanic basement rocks of the Cady Mountains. These alluvial-fan deposits dip gently to the northwest and interdigitate with lacustrine clays and silts in the center of the basin. About 70 ft. of fossiliferous lacustrine clays, silts, and sands lie horizontally above the conglomerates and older lake sediments. The uppermost sediments are alluvial arkosic sands and conglomerates that overlie the youngest lake beds, and are about 15 ft. thick.

Originally Manix Lake was restricted to the central portion of its basin and flanked by alluvial fans. As the basin was filled, lake sediments lapped on and covered over portions of the alluvial slopes. A wedge of fluviatile arkosic sand in the eastern part of the basin within the later lake beds may indicate a temporary retreat of the lake. A continuous sequence of lake beds near the center of the basin shows that one permanent lake was present until an outlet through Afton Canyon developed.

Fossil remains of fresh water gastropods, pelecypods, fish, tortoise, and water birds represent members of lake and lake-shore communities. Grassland and riparian communities are indicated by the following mammal genera: *Canis, Felis, Equus, Camelops, Tanupolama, Ovis, Bison, Mammuthus,* and *Nothrotherium* (not previously reported). A preliminary examination of the fauna reveals a Rancholabrean North American mammal age.

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SINCLAIR DINOSEIS

The *Dinoseis* seismic system, developed during the past 2 years by Sinclair Research, Inc., is described. This system uses a unique seismic pulse generator activated by a confined explosion. The pulse generator and recording equipment are shown in field operation movies. A comparison is made between *Dinoseis* and conventional seismic records in Texas and Oklahoma.

F. S. KRAMER AND M. L. SWAN, United Geophysical Corporation, Pasadena, California

HIGH-SPEED DIGITAL CORRELATOR FOR GEOPHYSICAL APPLICATION

Many of the processes used in the interpretation of geological and geophysical data basically involve the correlation or cross-comparison of related sets of well logs, seismograms, and other graphical data.

Commonly the correlation is done by visual inspection. Two sets of graphical data are viewed side-by-side, and displaced relative to each other until a maximum degree of correspondence is observed.

However, with the ever-increasing volume of accumulated geological information, there is a growing trend toward the automatic processing of data. The digital correlator described is a special-purpose computer specifically designed to perform correlation operations at speeds sufficiently high to permit "on-line" or real-time processing of geophysical field data.

The paper describes the basic correlation process and, schematically, how the process is carried out in the correlator, and includes pictures and description of the correlator itself.

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STRATIGRAPHIC EVIDENCE FOR LAS VEGAS VALLEY SHEAR ZONE

Longwell (1960) has postulated about 25 mi. of right-lateral displacement along a major shear zone in Las Vegas Valley, extending from Frenchman Mountain northwest past Mercury, Nevada. Because of their areal distribution, several Paleozoic stratigraphic units in

[1] This project was supported in part by Office of Naval Research Contract Nonr 228(17).

Clark County, Nevada, provide convincing evidence for right-lateral displacement that is in close accord with that postulated by Longwell.

The *Rhipidomella nevadensis* zone (=lower Indian Springs Member of Longwell and Dunbar, 1936) of (?) Early Pennsylvanian age is at the base of the Bird Spring Formation in the northwestern Spring Mountains on the southern side of the shear zone, but is present 26 mi. farther southeast (Dry Lake and Arrow Canyon Ranges) on the northern side of the shear zone. This fossil zone is missing, probably by facies change, from sections only a few miles farther southeast on both sides of Las Vegas Valley. The Arrowhead Limestone Member of the Monte Cristo Formation (Mississippian) is present in the southeastern Spring Mountains, the Goodsprings district east of the Keystone thrust (Hewett, 1931), and in the upper plate of the Keystone thrust in the central Spring Mountains, but is absent farther northwest. North of the shear zone this member is present in the central Muddy Mountains but is absent west of California Wash, indicating about 25 mi. of southeasterly displacement of rocks on the northern side of Las Vegas Valley. The Eureka Quartzite (Ordovician) is present in the northwestern Spring Mountains, and the Sheep, Las Vegas, and Arrow Canyon Ranges, but is absent east of California Wash and in the central Spring Mountains southeast of Mt. Charleston. The Kaibab Limestone (Middle Permian) is widely distributed in the Spring and Muddy Mountains, but is absent west of California Wash where thick fusulinid-bearing Permian limestones in the Las Vegas and Arrow Canyon Ranges presumably are chronologic equivalents.

TOM LEAL, Department of Fisheries, State of Washington, Olympia, Washington

FISHERY MANAGEMENT PROBLEMS AS RELATED TO MARINE SEISMIC SURVEYS DURING PETROLEUM EXPLORATIONS

Points to be covered:

1. Fisheries Department responsibility for protection of fishery resources in the state and contiguous waters extending seaward over the O.C.S. area.
2. The relative position of the fishing industry within the economic structure of Washington State and the importance of coastal fish stocks in the local, regional, and world food picture; the relative importance of anadromous, pelagic, and demersal fish stocks locally; and how values are established as the result of fish kills during seismic programs.
3. Fishing methods and areas where conflict is apt to be encountered with seismic exploration.
4. Permit provisions and requirements.
5. The problem of allowing seismic fleets to operate on a reasonable basis and to the fullest extent possible consistent with protection of fishery resources.
6. Public relations and what local reaction can do to your program.

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INTERTIDAL AND SHALLOW-WATER FORAMINIFERA OF TROPICAL PACIFIC OCEAN

Intertidal and shallow-water sediment samples from the tropical Pacific Ocean were studied and a quantitative analysis made of their constituents. The foraminiferal components exhibit both eurytopic and stenotopic distribution patterns. Seven methods of dispersal are listed and analyzed to help explain the eurytopic patterns. Hypotheses based on dispersal methods and fluctuations in populations are advanced to explain the stenotopic and sporadic fossil and recent occurrences of two important foraminiferal genera, *Tinoporus* (*Calcarina*) and *Baculogypsina*. An examination of the beach sands shows that although calcite, igneous, and metamorphic grains are the principal components in the majority of the samples, foraminiferal tests commonly comprise over 30 per cent of the sand. The remaining constituents are usually less than 1 per cent of the total. The analysis of the shallow-water Foraminifera from Johnson Island indicates that certain species have high numerical values in restricted areas. These occurrences are similar to those of the same species in the shallow waters of other islands.

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PLANKTONIC FORAMINIFERA IN WATER COLUMN, NEWPORT SUBMARINE CANYON[1]

Plankton tows were taken at 55 stations over Newport Submarine Canyon, along with temperature, salinity, and transparency measurements. Two factors modify prevailing conditions: upwelling of water in the canyon, and effluent flow from the Orange County sewer outfall.

Colder isotherms penetrate warm nearshore water during times of upwelling. Under such conditions, planktonic foraminiferal numbers increase fourfold in areas of previously low concentrations. High values are found in the canyon axis, whereas planktonic frequency decreases both north and south of the axis. However, an anomalous situation exists over the sewer outfall, where in relatively warm water, large quantities of Foraminifera are present. Increase in quantity of these forms appears to be caused by a supply of fresh nutrients provided by upwelling in the canyon and organic matter discharged from the sewer. These factors make it possible for a larger population to persist.

Foraminifera range in size from 60 to 250 microns, the lower limit being determined by the mesh size of the plankton net. Size distribution is significant because many programs employ nets larger than 250 microns. *Globigerina bulloides* composes 90 per cent or more of the samples. Scattered specimens of *Globigerina pachyderma* occur in deep tows along with *G. quinqueloba*. Some benthonic forms, species of *Bolivina*, were found in the tows, presumably because of either transport by upwelling bottom currents or float mechanisms.

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FORAMINFERAL FAMILY PSEUDOPARRELLIDAE VOLOSHINOVA

The family Pseudoparrellidae Voloshinova, 1952, commonly has not been recognized as a separate supra-generic category of the Foraminiferida. Previous family assignments of the genera now included in the Pseudoparrellidae have been based on incomplete or incorrect data. The family is now characterized by trochospiral or initially trochospiral test with monolamellid septa, radially-built, hyaline calcite walls and an aperture parallel to the margin of the test in the face of the last chamber. As redefined, the family includes six genera:

[1] This paper is a contribution of the Allan Hancock Foundation.