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At Shkapova a deeper field wildcat was using the electrodrill. Electricity at 1,500 volts is carried down 7-inch drill pipe by 3-conductor rubber-covered cables mounted concentrically. A finger with three rings on it slips into a sheath as the pipe is made up, and the mud pressure causes a good seal. This well was using a mudlogger with an automatically programmed gas chromatograph, which seemed very modern in design and instrumentation.

The engineers were alert, able, and intelligent. Questions and answers showed that they understood their problems thoroughly and were not just technicians.

The Russian equipment is lighter and plainer than American. We were told by some European drillers that it is mechanically inferior and more apt to break down. However, technologically, the Russians appear to be fully on a par with the US, and in some respects are using more advanced drilling techniques than we are.

January 14, 1963

James M. Forgotson, Jr., Pan American Petroleum Corporation, Tulsa, Oklahoma

"The Application of Digital Computers to Exploration Operations"

Abstract

The use of digital computers in exploration is oriented toward furnishing the geologist an additional tool. The applications presented here are primarily geological and can be used now on current projects as data are being determined.

Data processing is often merely a system for rapid recall of information and as such is being investigated as a means of handling scout information. Regardless of the procedure used to record the data and the completeness of the files, the idea is to record engineering and exploration data in a systematic manner, to store the recorded data on cards or tape and to develop computer filing, sorting and retrieval systems to handle large volumes of data.

Well locations, formation tops, rock type, thicknesses within a stratigraphic interval, and paleontological data obtained in current studies can be recorded in numerical form on cards or tape for computer input. From such input the computer can calculate structure, isopach, and various types of lithofacies, biofacies, and environmental data for map preparation. Card or tape computer output can be printed rapidly on data sheets and then plotted manually on maps or automatic plotting equipment may be used to print the output directly on base maps.

The use of electronic computers makes practical the computations necessary to distinguish between trends, or large-scale effects such as regional dip, influencing an entire region under consideration, and anomalies or small-scale effects influencing only small parts of a region. These computations that would require several months to do manually can be performed in several minutes by a high speed computer.

The use of electronic computers for quantitative electrical log analysis makes the analysis of many horizons in hundreds or even thousands of wells practical. These data may be used for exploration purposes and for more

rapid, complete evaluations of well productive potential.

Electronic computers permit rapid and accurate analysis of gravity and aeromagnetic data. The calculation of second derivatives and sophisticated methods for upward and downward continuation of the gravity or magnetic field are amenable to computer solution. The theoretical gravity or magnetic effect resulting from a known, or hypothetical, structure can be determined in detail rapidly by an electronic computer.

Automatic plotters enable large volumes of results to be made immediately available in their most useful form thereby retaining the advantage of the computer's speed.

Computers are available within major companies, and to smaller organizations and independents through service bureaus. Converting large volumes geological data to a form suitable for computer input can be done economically with proper planning by computer-oriented geologists. The exploration geologists should become sufficiently familiar with computers to recognize problems in which they can be used advantageously. A geologist who wants to use the computer for a particular problem should consult with people trained in the use of computers and preferably with experience in scientific or engineering computing.

January 21, 1963

William E. Ham, Oklahoma Geological Survey, Norman, Oklahoma

"Problems of Carbonate Rock Classification"

Abstract

Carbonate rocks consist of a closely related family of consolidated sediments, normally quite simple in mineralogical composition and generally marine in depositional environment. Various mixtures of only two mineral species -- calcite and dolomite -- make up the bulk of limestones and dolomites in this interesting and economically valuable group.

In addition to their mineralogical composition, the carbonate rocks possess three distinctive features which must be recognized in classification. First, most carbonate sediment is derived from sea water, the particles remaining within the basin where they originated. They are admixed with land-derived clastics along the margins of epicontinental basins, but offshore, and particularly in isolated banks of the Bahama type, the sediment is nearly pure carbonate of local origin. Second, there is strong dependence on organic activity. Secreted skeletal elements of both animals and plants, conspicuous in so many limestones that the possibility of chance occurrence is absolutely ruled out, demonstrate how calcium and magnesium carbonates are abstracted from sea water and fixed as sediment. Even the more enigmatic lime muds are known to be at least partly derived through organic processes. Finally, as a result of their peculiar chemical composition, the carbonate rocks are especially susceptible to solution and recrystallization. In all these respects the carbonate rocks are set distinctly apart from their nearest sedimentary relatives -- sandstones and shales -- and because of these distinctions they have unique problems of classification and interpretation.

Recrystallization in particular destroys original features, locally to the extent that meaningful classification becomes impossible. Pervasively recrystallized carbonates are thus set aside as a special group.